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ABSTRACT:

PROBLEM TO BE SOLVED: To attain miniaturization, power saving and high speed switching of a transmitter-receiver by providing a transmission function to a super- regenerative reception circuit consisting of an RF oscillation circuit and a quenching oscillation circuit.

SOLUTION: A self-exciting super-regenerative reception circuit 4 consists of an RF oscillation circuit 2 and a quenching oscillation circuit 3. In the case of reception, the quenching oscillation circuit 3 and the RF oscillation circuit 2 apply super-regenerative detection to a reception signal captured by an antenna 8 and the detected signal passes through a low-pass filter 7, from which received data are obtained. In the case of transmission, a quenching oscillation control circuit 5 stops the operation of the quenching oscillation circuit 3, a modulation circuit 6 modulates a high frequency signal generated by the RF oscillation circuit 2, and the modulated transmission signal is sent out from the antenna 8.

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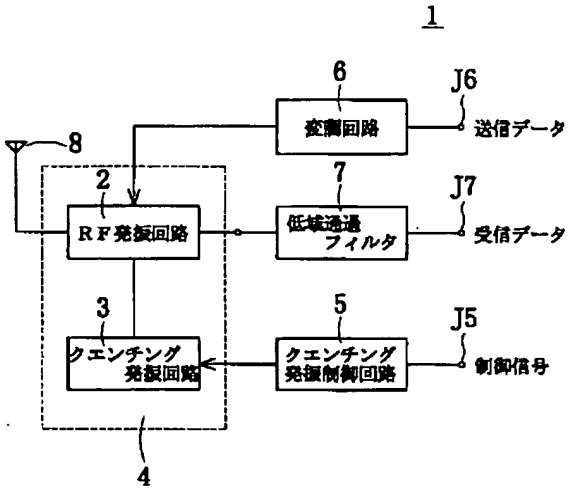
(54)【発明の名称】　送受信装置

(57)【要約】
【課題】　ＲＦ発振回路とクエンチング発振回路からなる超再生受信回路に送信機能を持たせることにより、送受信装置の小型化、省電力化および高速切替えを可能とする。
【解決手段】　ＲＦ発振回路２及びクエンチング発振回路３から自励式超再生受信回路４が構成される。受信動作時には、アンテナ８で捕捉した受信信号をクエンチング発振回路３とＲＦ発振回路２により超再生検波したのち、低域通過フィルタ７を通過させて受信データを得る。送信動作時には、クエンチング発振制御回路５によりクエンチング発振回路３を動作停止させ、ＲＦ発振回路２で生成した高周波信号を変調回路６で変調させ、変調した送信信号をアンテナ８から送り出す。



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【特許請求の範囲】

【請求項１】　高周波発振回路およびクエンチング発振回路を有する超再生受信手段と、前記クエンチング発振回路の発振のオン、オフを制御するクエンチング発振制御手段と、前記高周波発振回路により生成される所定周波数の信号を変調する変調手段と、信号を送信および受信するアンテナとを備え、

前記クエンチング発振制御手段により前記クエンチング発振回路のクエンチング発振を行なわせ、それにより前記アンテナで受信される変調波を前記超再生受信手段によって復調し、

また、前記クエンチング発振制御手段により前記クエンチング発振回路のクエンチング発振を停止させるとともに、前記変調手段により前記高周波発振回路が生成する所定周波数の信号を変調し、それにより前記アンテナから変調波を送信することを特徴とする送受信装置。

【請求項２】　高周波発振回路と、前記高周波発振回路をオン、オフ制御する高周波発振制御手段と、信号を送信および受信するアンテナとを備え、

受信動作時には、前記高周波発振制御手段をクエンチング発振させ、それにより前記アンテナで受信される変調波を前記高周波発振回路及び前記高周波発振制御手段によって復調し、

また、送信動作時には、前記高周波発振制御手段を変調動作させて前記高周波発振回路が生成する所定周波数の信号を変調し、それにより前記アンテナから変調波を送信することを特徴とする送受信装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は送受信装置に関する。特に、単一回線により半二重で交互通信を行う双方向の無線送受信装置に関する。

【０００２】

【従来の技術】各通信局間で送受信を行なわせるための通信方法としては、全二重通信方式と半二重通信方式とがある。全二重通信方式は、２チャネルを用いて各通信局間で並行して双方向の送信と受信を行なうものである。半二重通信方式は、単一チャネルにより交互に通信することにより双方向通信を可能にするものである。前者の全二重通信方式は、占有チャネル数が２チャンネルとなり、半二重通信方式の２倍のチャネルを占有するから、周波数の有効利用の点では不利である。

【０００３】しかし、全二重通信方式で双方向通信を行なうにしろ、半二重通信方式で双方向通信を行なうにしろ、各通信局毎に送信回路と受信回路の２系統を個別に必要とする。このため、従来にあっては、送受信装置の回路規模が大きくなり、送受信装置の小型化が妨げられていた。

【０００４】さらに、半二重通信方式では、送信回路と受信回路を所定の間隔で交互に切り替えて運用する構成

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となっているので、送信動作と受信動作の切替え時、送信回路又は受信回路が正常動作するまでのセットアップ時間が必要となり、レスポンスが悪くなるという欠点がある。また、レスポンス向上のため、送信回路と受信回路におのおの待機時にも通電を行うようにすると、送信回路と受信回路の２系統に常に電力を供給することになり、消費電力が大きくなるという問題がある。

【０００５】

【発明が解決しようとする課題】本発明は上述の技術的問題点を解決するためになされたものであり、その目的とするところは、受信回路に送信機能を持たせることにより、送受信装置の小型化、省電力化および高速切替えを可能とすることにある。

【０００６】

【発明の開示】請求項１に記載の送受信装置は、高周波発振回路およびクエンチング発振回路を有する超再生受信手段と、前記クエンチング発振回路の発振のオン、オフを制御するクエンチング発振制御手段と、前記高周波発振回路により生成される所定周波数の信号を変調する変調手段と、信号を送信および受信するアンテナとを備え、前記クエンチング発振制御手段により前記クエンチング発振回路のクエンチング発振を行なわせ、それにより前記アンテナで受信される変調波を前記超再生受信手段によって復調し、また、前記クエンチング発振制御手段により前記クエンチング発振回路のクエンチング発振を停止させるとともに、前記変調手段により前記高周波発振回路が生成する所定周波数の信号を変調し、それにより前記アンテナから変調波を送信することを特徴とするものである。

【０００７】本発明の送受信装置は、受信時には高周波発振回路とクエンチング発振回路からなる超再生受信回路によって受信動作し、送信時にはクエンチング発振を停止させて高周波発振回路と変調回路によって送信動作する。従って、送受信機能において高周波発振回路を共有させることができ、送受信装置の回路規模を小さくすることができる。

【０００８】また、高周波発振回路は送信時においても受信時においても常に動作状態にあるので、送受切替え時に必要な動作安定時間を大幅に短縮することができ、送受信のレスポンスを向上させることができる。さらに、送受信機能を共有して常に高周波発振回路を動作状態にしているので、待機時の暗電流や送受切替え時の突入電流がなくなり、省電力化を図ることができる。よって、バッテリ駆動の場合などには、電池を超寿命化することができる。

【０００９】また、高周波発振回路を常に動作状態に保っているので、送受信の切り替えに高周波スイッチ等の特殊部品を必要とせず、容易に送受信切替えが可能となる。

【００１０】従って、本発明の送受信装置によれば、携

帯機器の用途に最適な双方向無線通信装置を提供することができる。

【0011】また、請求項2に記載の送受信装置は、高周波発振回路と、前記高周波発振回路をオン、オフ制御する高周波発振制御手段と、信号を送信および受信するアンテナとを備え、受信動作時には、前記高周波発振制御手段をクエンチング発振させ、それにより前記アンテナで受信される変調波を前記高周波発振回路及び前記高周波発振制御手段によって復調し、また、送信動作時には、前記高周波発振制御手段を変調動作させて前記高周波発振回路が生成する所定周波数の信号を変調し、それにより前記アンテナから変調波を送信することを特徴としている。

【0012】請求項2に記載の送受信装置では、高周波発振回路をオン、オフ制御する高周波発振回路をクエンチング発振と変調動作に切り替えることにより、請求項1に記載した送受信装置と同様な機能を実現している。従って、請求項2の送受信装置にあっても、高周波発振回路の共有によって送受信装置の回路規模を小さくできる、送受切替え時の動作安定時間を大幅に短縮できて送受信のレスポンスを向上させることができる、省電力化を図ることができるといった効果を奏する。

【0013】従って、本発明の送受信装置によれば、携帯機器の用途に最適な双方向無線通信装置を提供することができる。

【0014】

【発明の実施の形態】図1は本発明の一実施形態による送受信装置1の構成を示すブロック図であって、ＡＳＫ（振幅偏移変調）による双方向無線送受信装置を示している。この送受信装置1は、ＲＦ発振回路2及びクエンチング発振回路3からなる自励式超再生受信回路4と、クエンチング発振回路3をオン、オフ制御するクエンチング発振制御回路5と、送信時にＲＦ発振回路2を制御して変調を行う変調回路6と、低域通過フィルタ（ローパスフィルタ）7と、信号を送信及び受信するアンテナ8とを備えている。ここで、ＲＦ発振回路2は受信信号のキャリア波（搬送波）に同調する周波数で発振するように設定されている。クエンチング発振回路3は、ＲＦ発振回路2の発振立ち上がりを抑制するように動作するものである。クエンチング発振制御回路5は、バイアス抵抗で回路条件を変えてクエンチング発振の有無を制御するものである。変調回路6は、送信データに応じてＲＦ発振回路の状態を可変し、変調動作を行なうものである。また、アンテナ8は送受共用のものを用いているが、送信用と受信用のものとが別々になっていても差し支えない。

【0015】まず、この送受信装置1の受信動作を図2（ａ）（ｂ）（ｃ）を用いて説明する。図2（ａ）はアンテナ8で捕捉されてＲＦ発振回路2に入力される受信信号の信号波形を示し、図2（ｂ）はＲＦ発振回路2に入力された図2（ａ）の受信信号がＲＦ発振回路2から出力される際の信号波形を示し、図2（ｃ）はさらに低域通過フィルタ7を通過した後の波形を示している。

【0016】受信動作時においては、クエンチング発振制御回路5がクエンチング発振回路3を動作させており、変調回路6は動作停止状態にある。いま、図2（ａ）の期間Ｔ1におけるように、アンテナ8で受信された受信信号が振幅0（コード「0」）の部分であって、アンテナ8からＲＦ発振回路2にキャリア波が入力されていないとする。この場合には、ＲＦ発振回路2で十分にＲＦ発振が立ちあがる前にクエンチング発振回路3のクエンチング発振によってＲＦ発振が停止させられ、次のＲＦ発振が開始する。このため、ＲＦ発振回路2から出力される信号は、図2（ｂ）に示すような小さな振幅の信号となり、低域通過フィルタ7を通過することによって検波出力はレベル「0」となる。

【0017】これに対し、図2（ａ）の期間Ｔ2におけるように、アンテナ8で捕捉されてＲＦ発振回路2に入力された受信信号がある振幅を持っている（コード「1」）と、ＲＦ発振回路2においてはキャリア波によってＲＦ発振が急速に立上がる［図2（ｂ）］。ＲＦ発振回路2で発生したＲＦ発振信号を低域通過フィルタ7に通すと、図2（ｃ）に示すように検波出力はレベル「1」となる。

【0018】このようにして、この送受信装置1においては、アンテナ8からＲＦ発振回路2に入力されるキャリア波（受信信号）の有無によるＲＦ発振の立上がり変化を低域通過フィルタ7に通すことで検波出力が得られ、これを復調された受信データとして出力する。

【0019】次に、送受信装置1の送信動作について説明する。送信動作時には、クエンチング発振制御回路5はクエンチング発振回路3を停止させている。変調回路6は、入力された送信データ（デジタル信号）の「1」、「0」に応じてにＲＦ発振回路2をオン、オフし、ＲＦ発振回路2で発生するキャリア波のＡＳＫ変調波形を得る。この変調波形の送信信号は、アンテナ8によって空間に放射される。

【0020】このようなＡＳＫ変調方式の双方向送受信装置1の具体的構成の一例を図3に示す。ＲＦ発振回路2は、トランジスタＴＲ20と、トランジスタＴＲ20のコレクタに接続されたインダクタＬ20及びキャパシタＣ20からなる共振回路ＬＣと、トランジスタＴＲ20のコレクタ・エミッタ間に接続されたキャパシタＣ21と、トランジスタＴＲ20のエミッタ・ベース間に接続されたキャパシタＣ22とで構成された変形コルピッツ発振回路を基本とし、共振回路ＬＣの上側電圧を分圧抵抗Ｒ20及びＲ21で分圧した電圧をトランジスタＴＲ20のベースに印加し、共振回路ＬＣの信号入力側とグランドとの間にキャパシタＣ23を接続し、トランジスタＴＲ20のベースとグランドの間にキャパシタＣ2

4を接続してあり、トランジスタTR20のコレクタがアンテナ8に接続されている。クエンチング発振回路3は、RF発振回路2と共用のトランジスタTR20と、トランジスタTR20のエミッタとグランド間に並列にして接続された抵抗R30及びキャパシタC30からなる弛張発振回路で構成されている。クエンチング発振制御回路5は、トランジスタTR50、そのエミッタ・ベース間に接続された抵抗R50及びベース抵抗R51からなるデジタルトランジスタ回路と、出力部に設けられた高抵抗値の抵抗R52とで構成されている。ベース抵抗R51の一端に位置する入力端子J5には、クエンチング発振制御回路5の制御信号が入力され、出力端はRF発振回路2の共振回路LCに接続されている。また、変調回路6は、トランジスタTR60、そのエミッタ・ベース間に接続された抵抗R60及びベース抵抗R61からなるデジタルトランジスタ回路と、出力部に設けられた低抵抗値の抵抗R62とで構成されている。ベース抵抗R61の一端に位置する入力端子J6には送信データが入力され、出力端はRF発振回路2の共振回路LCに接続されている。従って、クエンチング発振制御回路5と変調回路6とは、同じ回路構成を有しているが、クエンチング発振制御回路5では、出力部に高抵抗R52を用いているのに対し、変調回路6では、出力部に低抵抗R62を用いている。低域通過フィルタ7は、抵抗R70とキャパシタC70をL形接続して構成されており、低域通過フィルタ7の入力部はRF発振回路2の共振回路LCに接続されており、出力端子J7からは復調された受信データが取り出される。

【0021】この送受信装置1の受信動作時における回路動作を説明すると、以下に述べるとおりである。クエンチング発振制御回路5は、受信動作時には入力端子J5をローレベルに設定され、トランジスタTR50がオンになってRF発振回路2とクエンチング発振回路3に電源VDDを供給する。変調回路6は、入力端子J6をハイレベルに設定され、トランジスタTR60がオフとなって変調動作を停止する。これによりRF発振回路2とクエンチング発振回路3によって超再生検波が行われ、アンテナ8で受信した受信信号によって変化したRF発振回路2の発振波形を低域通過フィルタ7に通すことで検波出力（受信データ）を得る。

【0022】また、送信動作時には、逆にクエンチング発振制御回路5の端子J5をハイレベルに設定してトランジスタTR50をオフにする。一方、変調回路6は、送信データ（負論理）が端子J6から入力されることにより、RF発振回路2とクエンチング発振回路3に電源VDDを供給するが、抵抗R62が低抵抗であるため、インダクタL20及びキャパシタC20で決まる共振周波数以外はトランジスタTR20への帰還量が大幅に減少する。その結果としてクエンチング発振が停止し、RF発振回路2のみが送信信号によってオン、オフ制御され、ASK変調された送信信号がアンテナ8から送出される。

【0023】このような構成の送受信装置1によれば、送受信機能においてRF発振回路2を共用することができるので、送受信装置1の回路を小型化することができる。また、送受信回路が共有されていてRF発振回路2が常に動作状態にあるため、送受信切替後のセットアップ時間を短縮することができ、レスポンスも向上する。さらに、送受信回路の共有により、待機動作時の暗電流が不要となり、かつ送受信切替時の突入電流も低減できるので、送受信装置1の省電力化を図ることができる。また、高周波スイッチ等の特殊な部品を用いることなく、送受信回路の切替えも行うことができる。

【0024】（第2の実施形態）図4は本発明の別な実施形態による送受信装置11を具体的に示す回路図であって、RF発振回路2を外部クエンチング発振で制御する他励式超再生受信回路4を用いたものである。この実施形態の送受信装置11もブロック図で表わせば図1のブロック図と同じであるので、図4の具体回路図に従って説明する。

【0025】RF発振回路2は、トランジスタTR20と、トランジスタTR20のコレクタに接続されたインダクタL20及びキャパシタC20からなる共振回路LCと、トランジスタTR20のコレクタ・エミッタ間に接続されたキャパシタC21と、トランジスタTR20のエミッタ・ベース間に接続されたキャパシタC22とで構成された変形コルピッツ発振回路を基本とし、トランジスタTR20のエミッタとグランドの間にエミッタ抵抗R22を接続し、共振回路LCの上側電圧を分圧抵抗R20及びR21で分圧した電圧をトランジスタTR20のベースに印加し、共振回路LCの信号入力側とグランドとの間にキャパシタC23を接続し、トランジスタTR20のベースとグランドの間にキャパシタC24を接続してあり、トランジスタTR20のコレクタがアンテナ8に接続されている。

【0026】クエンチング発振回路3は、外部からRF発振回路2の制御を行うもので、この実施形態では発振用集積回路IC12を用いて実現され、その出力はRF発振回路2の入力部（共振回路LC）に接続されている。また、クエンチング発振制御回路5は、トランジスタTR50、そのエミッタ・ベース間に接続された抵抗R50及びベース抵抗R51からなるデジタルトランジスタ回路で構成されている。ベース抵抗R51の一端に位置する入力端子J5には、クエンチング発振制御回路5の制御信号が入力され、出力端（トランジスタTR50のコレクタ）はクエンチング発振回路3に直接に接続されている。また、変調回路6は、トランジスタTR60、そのエミッタ・ベース間に接続された抵抗R60及びベース抵抗R61からなるデジタルトランジスタ回路と、出力部の抵抗R63とで構成されている。ベース抵

抗Ｒ６１の一端の入力端子Ｊ６には送信データが入力され、出力端はＲＦ発振回路２の共振回路ＬＣに接続されている。低域通過フィルタ７は、抵抗Ｒ７０とキャパシタＣ７０をＬ形接続して構成されており、低域通過フィルタ７の入力部はＲＦ発振回路２の共振回路ＬＣに接続されており、出力端子Ｊ７からは復調された受信データが取り出される。

【００２７】まず、この送受信装置１１の受信動作を説明する。クエンチング発振制御回路５は、受信動作時には入力端子Ｊ５をローレベルに設定され、トランジスタＴＲ５０がオンになってクエンチング発振回路３に電源ＶＤＤを供給し、ＲＦ発振回路２のクエンチング制御を行う。変調回路６は、入力端子Ｊ６をハイレベルに設定され、トランジスタＴＲ６０がオフとなって変調動作を停止する。これによりＲＦ発振回路２とクエンチング発振回路３によって超再生検波が行われ、アンテナ８で受信した受信信号によって変化したＲＦ発振回路２の発振波形を低域通過フィルタ７に通すことで検波された受信データを得る。

【００２８】また、送信動作時には、逆にクエンチング発振制御回路５の入力端子Ｊ５をハイレベルに設定してトランジスタＴＲ５０をオフにし、クエンチング発振回路３を動作停止させる。一方、変調回路６は、送信データ（負論理）が入力端子Ｊ６から入力されることにより、ＲＦ発振回路２が送信信号によってオン、オフ制御され、ＡＳＫ変調された送信信号がアンテナ８から送出される。

【００２９】従って、このように他励式超再生受信回路を用いた実施形態でも、自励式超再生受信回路を用いた第１の実施形態と同様な作用効果を奏することができる。

【００３０】（第３の実施形態）図５は本発明のさらに別な実施形態による双方向無線送受信装置２１を示す具体回路図である。この送受信装置２１においては、ＲＦ発振回路２をオン、オフ制御するＲＦ発振制御回路２２によってクエンチング発振回路３と変調回路６とが構成されており、受信動作時にはＲＦ発振制御回路２２はクエンチング発振回路３として動作することで超再生検波し、送信動作時にはＲＦ発振制御回路２２は変調回路６として動作する。この実施形態を図５の具体回路図に従って説明する。図５ではＲＦ発振制御回路２２はマイクロプロセッサ（ＣＰＵ）によって構成されているが、ＩＣや個別回路素子によって構成されていても差し支えない。

【００３１】ＲＦ発振回路２は、トランジスタＴＲ２０と、トランジスタＴＲ２０のコレクタに接続されたインダクタＬ２０及びキャパシタＣ２０からなる共振回路ＬＣと、トランジスタＴＲ２０のコレクタ・エミッタ間に接続されたキャパシタＣ２１と、トランジスタＴＲ２０のエミッタ・ベース間に接続されたキャパシタＣ２２とで構成された変形コルピッツ発振回路を基本とし、トランジスタＴＲ２０のエミッタとグランドの間にエミッタ抵抗Ｒ２２を接続し、共振回路ＬＣの上側電圧を分圧抵抗Ｒ２０及びＲ２１で分圧した電圧をトランジスタＴＲ２０のベースに印加し、共振回路ＬＣの信号入力側とグランドとの間にキャパシタＣ２３を接続し、トランジスタＴＲ２０のベースとグランドの間にキャパシタＣ２４を接続してあり、トランジスタＴＲ２０のコレクタがアンテナ８に接続されている。また、クエンチング発振回路３及び変調回路６は、１個のＣＰＵからなるＲＦ発振制御回路２２で構成されている。低域通過フィルタ７は、抵抗Ｒ７０とキャパシタＣ７０をＬ形接続して構成されており、低域通過フィルタ７の入力部はＲＦ発振回路２の共振回路ＬＣに接続されており、出力端子Ｊ７からは復調された受信データが取り出される。

【００３２】まず、受信動作時の回路動作を説明する。受信動作時においては、ＲＦ発振制御回路２２はクエンチング発振回路３として動作し、ＲＦ発振回路２に対してクエンチング発振波形を出力し、ＲＦ発振回路２をクエンチング制御する。これによりアンテナ８で捕捉されＲＦ発振回路２に入力された受信信号の超再生検波が行われ、受信信号によって変化した発振波形を低域通過フィルタ７に通すことで受信データ（検波出力）が得られる。

【００３３】また、送信動作時にはＲＦ発振制御回路２２は変調回路６として動作する。送信動作時においては、ＲＦ発振制御回路２２はＲＦ発振回路２に対して送信データを出力し、ＲＦ発振回路２をオン、オフ制御することにより送信信号をＡＳＫ変調し、ＡＳＫ変調された送信信号をアンテナ８から送出する。

【００３４】（第４の実施形態）図６は本発明のさらに別な実施形態による送受信装置３１の具体回路図であって、自励式超再生受信回路４を用いたＦＳＫ（周波数偏移変調）方式の双方向送受信装置を示している。この送受信装置３１においては、ＲＦ発振回路２、クエンチング発振回路３、クエンチング発振制御回路５、低域通過フィルタ７の構成は図３に示したものと同様であるから、説明を省略する。変調回路６は、Ｄ／Ａ変換器（デジタル／アナログ変換器）３２によって構成されており、変調回路６は、送信動作時には送信データの「０」、「１」コードに応じてＲＦ発振回路２にＶ１、Ｖ２（Ｖ１＜Ｖ２）の電圧信号を出力することによってＲＦ発振回路２を電位制御し、寄生容量を変化させることによって発振周波数をＦ１とＦ２に変化させ、ＦＳＫ変調を行なう。ＲＦ発振回路２に２種類の電位Ｖ１、Ｖ２が加わると、トランジスタＴＲ２０のＶｃｂ－Ｃｏｂ特性による発振条件が変化することによって周波数が変化し、送信信号がＦＳＫ変調される。こうしてＦＳＫ変調された送信信号はアンテナ８から送出される。

【００３５】また、超再生受信回路４はもともとＦＳＫ

受信が可能な検波回路であるから、この送受信装置３１もＦＳＫ変調信号を受信して検波することができる。すなわち、超再生受信回路４は、図７に示すような周波数－受信特性を有しており、受信周波数が変化すると、図８に示すように受信出力に電圧変化ΔＶ＝Ｖ２－Ｖ１が現れるので、ＦＳＫ信号を受信して検波することができる。

【００３６】図９は他励式超再生受信回路を用いたＦＳＫ変調方式の双方向無線送受信装置４１を示す具体回路図である。この送受信装置４１は、変調回路６以外は図４の他励式再生受信回路を用いた送受信装置１１と同一の構成を有しており、変調回路６は図６に示した送受信装置３１の変調回路６と同じくＤ／Ａ変換器３２によって構成したものであって、同様な作用によって送信信号をＦＳＫ変調し、受信信号をＦＳＫ検波する。

【００３７】（送受信装置の応用例）本発明の送受信装置は、種々の応用分野を有しているが、そのうちの幾つかを以下に説明する。図１０～図１２は本発明の送受信装置を用いた車両５１のワイヤレス・ドアロック装置を示す。これは図１０に示すように、操作側のコントローラ（以下、主局という）５２から車両５１に搭載されたコントローラ（以下、従局という）５３に無線送信信号を送信し、従局５３から出力される制御信号によって車両５１のドアを施錠または開錠させるようにしたものであって、主局５２と従局５３との間に応答確認機能を持たせている。

【００３８】主局５２は、図１１に示すように、施錠スイッチ５４、解錠スイッチ５５、応答確認用のランプやブザー等の報知器５６、中央演算処理装置５７、記憶装置５８および本発明に係る送受信装置５９を備えている。しかして、操作者により施錠スイッチ５４または解錠スイッチ５５が操作されると、そのスイッチ５４、５５による施錠命令または解錠命令が中央演算処理装置５７に伝えられる。命令を受け取った中央演算処理装置５７は、その命令の内容に応じた指令コードと主局５２の識別を行なうＩＤコードを記憶装置５８から呼び出し、これら２つのコードを組み込んだ送信信号を生成する。施錠スイッチ５４または解錠スイッチ５５が操作された時の送受信装置５９は、中央演算処理装置５７によって送信回路として働くように制御される。そして、この送信信号を送受信装置５９で高周波信号に変調し、アンテナ８から空間に放射する。

【００３９】車両５１に搭載された従局５３は、図１２に示すように、本発明に係る送受信装置６０、中央演算処理装置６１、記憶装置６２およびドアロック装置を施錠又は解錠させるためのアクチュエータ６３を備えている。送受信装置６０は、通常の待機状態においては、中央演算処理装置６１によって受信回路として働くように制御されている。空間伝播によって主局５２から従局５３へ送られた送信信号は、従局５３のアンテナ８で捕らえられ、送受信装置６０で指令コードおよびＩＤコードが検波される。検波されたコードは、中央演算処理装置６１によって記憶装置６２内のコードと比較判定される。ここでＩＤコードが一致すると、中央演算処理装置６１は指令コードの内容に応じた制御信号をアクチュエータ６３に出力し、指令コードに応じて車両５１のドアを施錠もしくは解錠させる。

【００４０】ついで、従局５３の中央演算処理装置６１はドアが指令どおり施錠もしくは解錠されたことを確認すると、送受信装置６０を送信回路として働くように制御して暗号鍵（ＩＤコードと同じものでもよく、異なるものであってもよい）を含んだ確認信号を出力し、送受信装置６０で変調された確認信号をアンテナ８から送信して応答する。

【００４１】一方、主局５２においては、施錠スイッチ５４または解錠スイッチ５５が操作されて送信信号をアンテナ８から送出した直後に、中央演算処理装置５７により送受信装置５９が受信回路として働くように制御されている。従って、従局５３から確認信号が送られると、応答信号は主局５２のアンテナ８で捕捉され、送受信装置５９によって検波される。主局５２の中央演算処理装置５７は、検波された確認信号を記憶装置５８内の暗号鍵情報と比較照合し、コードが一致すれば、確認信号によって伝えられた情報をランプやブザー等の報知器５６によって操作者に伝達する。

【００４２】このようにワイヤレス・ドアロック装置に本発明の送受信装置５９、６０を用い、さらに応答信号に暗号鍵情報を含ませることにより、高速レスポンスと防犯性の向上を図ることができる。

【００４３】（第２の応用例）図１３～図１５に示すものは本発明の送受信装置の別な応用例であって、車両７１のワイヤレス・エンジンスタータ装置である。これは図１３に示すように、操作側である主局７２からの無線送信信号により車両７１のエンジンの始動及び停止を遠隔制御するワイヤレス・エンジンスタータ装置において、エンジンや変速機の状態を示す情報を含む応答信号を車両７１に搭載された従局７３から主局７２へ返す応答確認機能を持たせたものである。

【００４４】主局７２は、図１４に示すように、エンジンスタートスイッチ７４、エンジンストップスイッチ７５および応答確認用のランプやブザー等の報知器７６、中央演算処理装置７７、記憶装置７８及び本発明に係る送受信装置７９を備えている。しかして、操作者によりエンジンスタートスイッチ７４またはエンジンストップスイッチ７５が操作されると、そのスイッチ７４、７５によるエンジンスタート命令またはエンジンストップ命令が中央演算処理装置７７に伝えられる。命令を受け取った中央演算処理装置７７は、その命令の内容に応じた指令コードと主局７２の識別を行なうＩＤコードを記憶装置７８から呼び出し、これら２つのコードを組み込ん

だ送信信号を生成する。エンジンスタートスイッチ７４またはエンジンストップスイッチ７５を操作された主局７２では、中央演算処理装置７７によって送受信装置７９は送信回路として働くように制御されている。そして、この送信信号を送受信装置７９で高周波信号に変調し、アンテナ８から空間に放射する。エンジンスタートスイッチ７４またはエンジンストップスイッチ７５を操作されて送信信号をアンテナ８から送出した主局７２では、中央演算処理装置７７により送受信装置７９が受信回路として働くように切り替えられる。

【００４５】一方、車両７１に搭載された従局７３は、図１５に示すように、本発明に係る送受信装置８０、中央演算処理装置８１、記憶装置８２、セルモータ８４や燃料供給装置８５、点火装置８６等を制御するエンジン制御装置８３を備えている。従局７３では、通常の待機状態においては、中央演算処理装置８１により送受信装置８０は受信回路として働くように制御されている。空間伝播によって主局７２から従局７３へ送られた送信信号は、従局７３のアンテナ８で捕えられ、送受信装置８０で指令コードおよびＩＤコードの復調が行われる。復調されたコードは、中央演算処理装置８１によって記憶装置８２内のコードと比較判定される。ここでＩＤコードが一致すると、中央演算処理装置８１は指令コードの内容に応じた制御信号をエンジン制御装置８３に出力し、指令コードに応じてセルモータ８４や燃料供給装置８５、点火装置８６等を制御させる。

【００４６】ついで、中央演算処理装置８１は、エンジン始動もしくはエンジン停止が成功したこと、あるいはエンジンや変速機の故障によっていずれかの動作に失敗したことを検知する。ついで、中央演算処理装置８１は、送受信装置８０を送信回路として働くように切り替え、制御動作の成功または失敗を示す情報を含めた応答信号を送受信装置８０から出力させ、アンテナ８を通じて応答信号を送り出すことによって応答する。

【００４７】この応答信号が主局７２によって受信されると、主局７２の中央演算処理装置７９は応答信号に含まれている情報に基づき、エンジン始動もしくはエンジン停止に成功したこと、あるいはエンジンや変速機の故障のためエンジンを始動できないことなどを知り、これを報知器７６におけるランプの点滅状態やブザーの音の音色の違い等によって報知する。

【００４８】このようにワイヤレス・エンジンスタータ装置に本発明の送受信装置７９、８０を採用し、さらに応答信号に故障情報等を含ませることにより、失敗した場合には、送受信の失敗によるものか、エンジン等の故障によるものかを操作者に報知することができる。また、ワイヤレス・エンジンスタータ装置に本発明の送受信装置７９、８０を用いれば、主局７２を小型化することができるので、主局７２の携帯性が向上する。また、本発明の送受信装置７９、８０を用いれば、消費電力を小さくすることができるので、主局７２の電池を長持ちさせることができて電池交換頻度を低下させることができ、従局７３でも車載バッテリの消耗を低減することができる。さらに、車両７１の状態を手元の主局７２（報知器７６）で確認できるので、操作の確実性及び安全性が高まり、実際にエンジンが始動しているかといった操作者の不安感を拭うことができる。

【００４９】（第3の応用例）図１６～図１８はさらに別な応用例であって、ワイヤレス・ガレージ扉開閉装置を示している。これは図１６に示すように、操作側である主局９３からの無線送信信号によりガレージ９１の扉（シャッター）９２を開閉するワイヤレス・ガレージ扉開閉装置に応答確認機能を持たせたものである。

【００５０】主局９３は、図１７に示すように、扉開成スイッチ９５、扉閉成スイッチ９６、応答確認用のランプやブザー等の報知器９７、中央演算処理装置９８、記憶装置９９および本発明に係る送受信装置１００を備えている。しかして、操作者により扉開成スイッチ９５または扉閉成スイッチ９６が操作されると、そのスイッチ９５、９６による扉開成命令または扉閉成命令が中央演算処理装置９８に伝えられる。命令を受け取った中央演算処理装置９８は、その命令の内容に応じた指令コードと主局９３の識別を行なうＩＤコードを記憶装置９９から呼び出し、これら２つのコードを組み込んだ送信信号を生成する。扉開成スイッチ９５または扉閉成スイッチ９６が操作されると、中央演算処理装置９８は、送受信装置１００を送信回路として働くように制御する。そして、この送信信号を送受信装置１００で高周波信号に変調し、アンテナ８から空間に放射する。扉開成スイッチ９５または扉閉成スイッチ９６を操作されて送信信号をアンテナ８から送出した主局９３では、中央演算処理装置９８により送受信装置１００が受信回路として働くように切替えられる。

【００５１】一方、ガレージ９１に設置された従局９４は、図１８に示すように、本発明に係る送受信装置１０１、中央演算処理装置１０２、記憶装置１０３、ガレージ扉９２を開成又は閉成させるためのモータ１０４を備えている。また、待機状態にある従局９４では、送受信装置１０１は中央演算処理装置１０２により受信回路として働くように制御されている。空間伝播によって主局９３から従局９４へ送られた送信信号は、従局９４のアンテナ８で捕らえられ、送受信装置１０１で指令コードおよびＩＤコードの検波が行われる。検波されたコードは、中央演算処理装置１０２によって記憶装置１０３内のコードと比較判定される。ここでＩＤコードが一致すると、中央演算処理装置１０２は指令コードの内容に応じた制御信号をモータ１０４に出力し、指令コードに応じてガレージ扉９２を開き、あるいは閉じる。

【００５２】ついで、中央演算処理装置１０２はドアが指令どおり施錠もしくは解錠されたことを確認すると、

送受信装置１０１を送信回路として働くように切り替え、ガレージ扉９２の状態を表わす情報や暗号鍵情報を含んだ応答信号を送受信装置１０１から出力させ、アンテナ８を通じて応答信号を主局９３へ送信する。

【００５３】主局９３は、送信信号を送った直後に応答信号を受信すると、暗号鍵情報を照合し、暗号鍵情報が一致すると、応答信号に含まれるガレージ扉９２の状態に関する情報に基づき、ガレージ扉９２が開いている、あるいは閉じていることを報知器９７で報知する。

【００５４】このようにワイヤレス・ガレージ扉開閉装置に本発明の送受信装置１００、１０１を採用し、さらに応答信号に暗号鍵情報を含ませることにより、高速レスポンスと防犯性の向上といった効果を得ることができる。また、本発明の送受信装置１００、１０１を用いることにより主局９３を小型化することができるので、操作側である主局９３の携帯性が向上する。また、本発明の送受信装置１００、１０１を用いることによって電力消費を少なくできるので、主局９３の電池消耗を抑えて電池交換頻度を少なくし、従局９４側では車載バッテリの消耗を低減できる。さらに、ガレージ９１の開閉状態を手元の主局９３で確認できるため、夜間等で開閉が直接確認ができない状況でもガレージ扉９２の開閉状況の把握が可能となる。

【００５５】（第４の応用例）図１９～図２１はさらに別な応用例であって、機器を遠隔操作するためのテレコントロールシステムを示している。これは図１９に示すように、操作側である主局１１２からの無線送信信号により離れた位置にある車両等の機器１１１を上下左右に移動させるためのテレコントロールシステムに応答確認機能を持たせたものである。

【００５６】主局１１２は、図１７に示すように、上移動の操作スイッチ１１４、下移動の操作スイッチ１１５、右移動の操作スイッチ１１６、左移動の操作スイッチ1-17、応答確認用のランプやブザー等の報知器１１８、中央演算処理装置１１９、記憶装置１２０および本発明に係る送受信装置１２１を備えている。しかして、操作者により上下左右のいずれかの操作スイッチ１１４～１１７が操作されると、その操作スイッチ１１４～１１７による制御命令が中央演算処理装置１１９に伝えられる。命令を受け取った中央演算処理装置１１９は、その命令の内容に応じた指令コードと主局１１２の識別を行なうＩＤコードを記憶装置１２０から呼び出し、これら2つのコードを組み込んだ送信信号を生成する。いずれかの操作スイッチ１１４～１１７が操作されると、中央演算処理装置１１９は、送受信装置１２１を送信回路として働くように制御する。そして、この送信信号を送受信装置１２１で高周波信号に変調し、アンテナ８から空間に放射する。いずれかの操作スイッチ１１４～１１７が操作されて送信信号をアンテナ８から送出した主局１１２では、中央演算処理装置１１９により送受信装置

１２１が受信回路として働くように切替えられる。

【００５７】一方、機器１１１に搭載された従局１１３は、図２１に示すように、本発明に係る送受信装置１２２、中央演算処理装置１２３、記憶装置１２４、モータを正転させて機器１１１を上方へ移動させるためのモータ制御部１２５、モータを逆転させて機器１１１を下方へ移動させるためのモータ制御部１２６、ハンドルを右回転させて機器１１１を右へ移動させるためのハンドル制御部１２７、ハンドルを左回転させて機器１１１を左へ移動させるためのハンドル制御部１２８を備えている。また、待機状態にある従局１１３では、送受信装置１２２は中央演算処理装置１２３により受信回路として働くように制御されている。空間伝播によって主局１１２から従局１１３へ送られた送信信号は、従局１１３のアンテナ８で捕らえられ、送受信装置１２２で指令コードおよびＩＤコードの検波が行われる。検波されたコードは、中央演算処理装置１２３によって記憶装置１２４内のコードと比較判定される。ここでＩＤコードが一致すると、中央演算処理装置２１３は指令コードの内容に応じた制御信号をモータ制御部１２５、１２６またはハンドル制御部１２７、１２８に出力し、指令コードに応じて機器１１１を上下左右に移動させる。

【００５８】ついで、従局１１３の中央演算処理装置１２３は機器１１１が指令どおり移動したことを確認すると、送受信装置１２２を送信回路として働くように切り替え、機器１１１の移動状態を表わす情報を含んだ応答信号を送受信装置１２２から出力させ、アンテナ８を通じて応答信号を主局１１２へ送信する。

【００５９】主局１１２は、送信信号を送り出した直後に応答信号を受信すると、応答信号に含まれる機器１１１の移動状態に関する情報を解読子、機器の移動状態を報知器９７で報知する。

【００６０】このようにテレコントロールシステムに本発明の送受信装置を採用し、さらに応答信号に暗号鍵情報を含ませることにより、応答性を向上させることができる。さらに、本発明の送受信装置１２１、１２２を用いることにより、主局１１２を小型化することができるので、操作側である主局１１２の携帯性を向上させることができる。また、本発明の送受信装置１２１、１２２を用いることによって電力消費を少なくできるので、主局１１２の電池消耗を抑えて電池交換頻度を少なくできる。さらに、機器１１１の操作状態を手元の主局１１２で確認できるため、操作対象となる機器１１１を直接見ることができない状況でも操作状態を把握しながら操作することができ、操作の確実性と信頼性を向上させることができる。

【図面の簡単な説明】

【図１】本発明の一実施形態であって、自励式超再生受信回路を用いたＡＳＫ方式の送受信装置の構成を示すブロック図である。

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【図2】（a）（b）（c）は同上の送受信装置の受信動作を説明するための各部の波形図である。

【図3】同上の送受信装置の具体回路の一例を示す回路図である。

【図4】本発明の別な実施形態であって、他励式超再生受信回路を用いたＡＳＫ方式の送受信装置の構成を示す回路図である。

【図5】本発明のさらに別な実施形態であって、他励式超再生受信回路を用いたＡＳＫ方式の送受信装置の構成を示す回路図である。

【図6】本発明のさらに別な実施形態であって、自励式超再生受信回路を用いたＦＳＫ方式の送受信装置の構成を示す回路図である。

【図7】超再生受信回路の周波数－受信特性を示す図である。

【図8】超再生受信回路の受信動作を説明する図である。

【図9】本発明のさらに別な実施形態であって、他励式超再生受信回路を用いたＦＳＫ方式の送受信装置の構成を示す回路図である。

【図10】本発明の送受信装置の応用例であって、ワイヤレス・ドアロック装置を示す説明図である。

【図11】同上のワイヤレス・ドアロック装置の主局の構成を示すブロック図である。

【図12】同上のワイヤレス・ドアロック装置の従局の構成を示すブロック図である。

【図13】本発明の送受信装置の応用例であって、ワイヤレス・エンジンスタータ装置を示す説明図である。

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【図14】同上のワイヤレス・エンジンスタータ装置の主局の構成を示すブロック図である。

【図15】同上のワイヤレス・エンジンスタータ装置の従局の構成を示すブロック図である。

【図16】本発明の送受信装置の応用例であって、ワイヤレス・ガレージ扉開閉装置を示す説明図である。

【図17】同上のワイヤレス・ガレージ扉開閉装置の主局の構成を示すブロック図である。

【図18】同上のワイヤレス・ガレージ扉開閉装置の従局の構成を示すブロック図である。

【図19】本発明の送受信装置の応用例であって、テレコントロールシステムを示す説明図である。

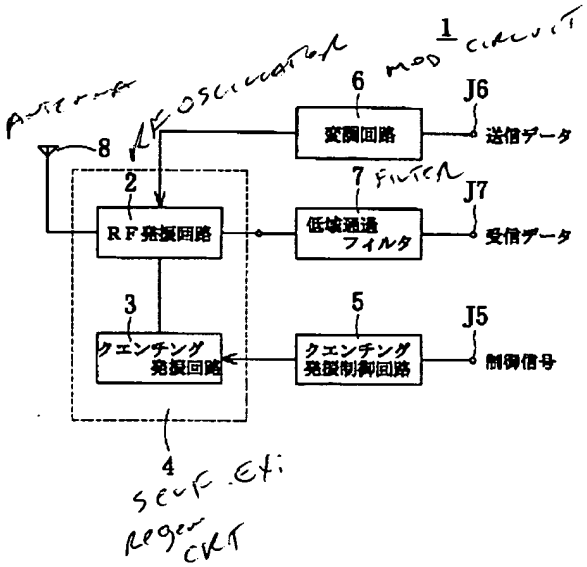
【図20】同上のテレコントロールシステムの主局の構成を示すブロック図である。

【図21】同上のテレコントロールシステムの従局の構成を示すブロック図である。

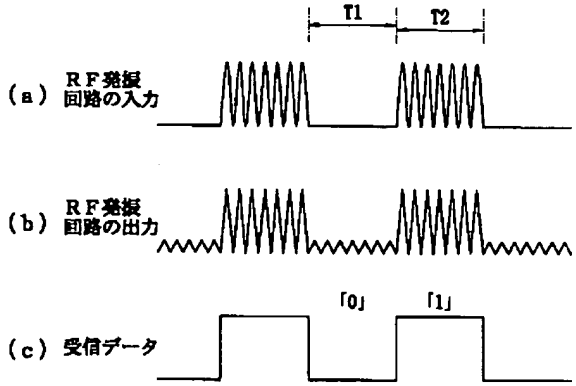
【符号の説明】

2　ＲＦ発振回路
3　クエンチング発振回路
4　超再生受信回路
5　クエンチング発振制御回路
6　変調回路
7　低域通過フィルタ
8　アンテナ
22　ＲＦ発振制御回路

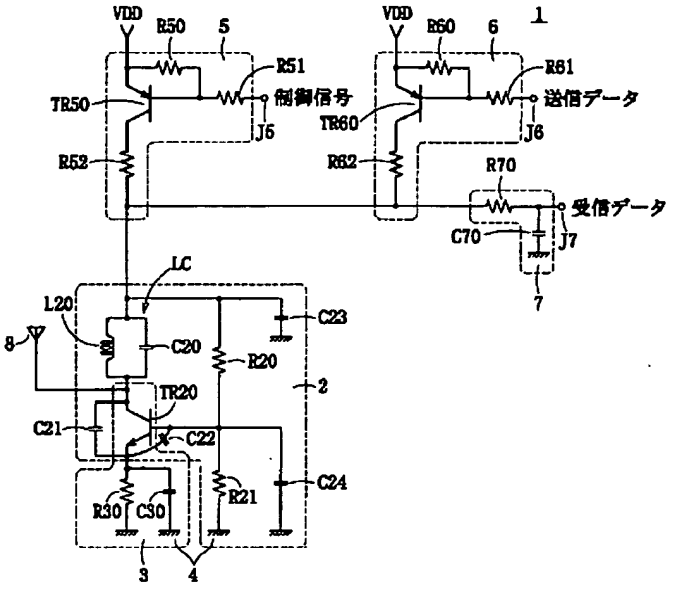
【図1】



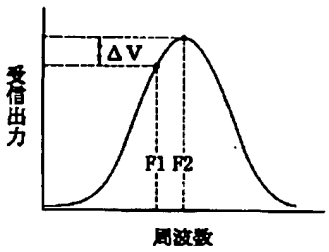
【図2】



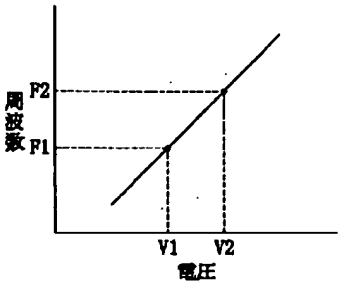
【図3】



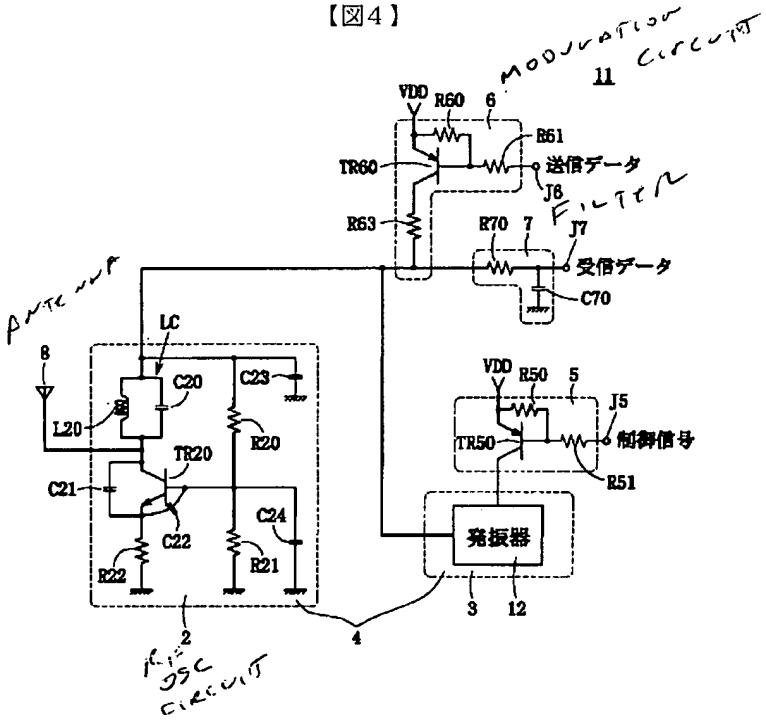
【図7】



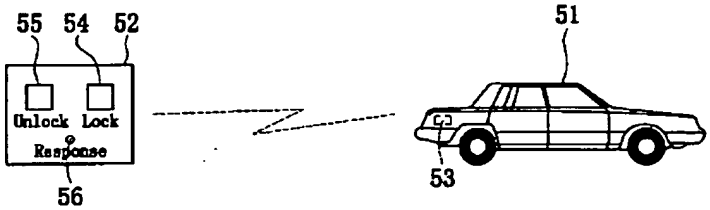
【図8】



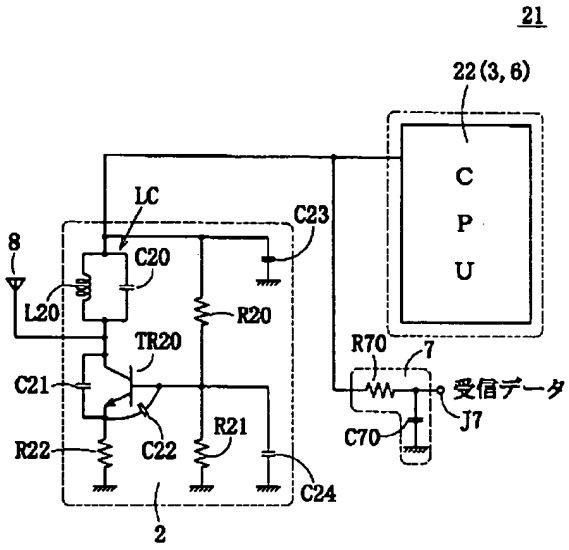
【図4】



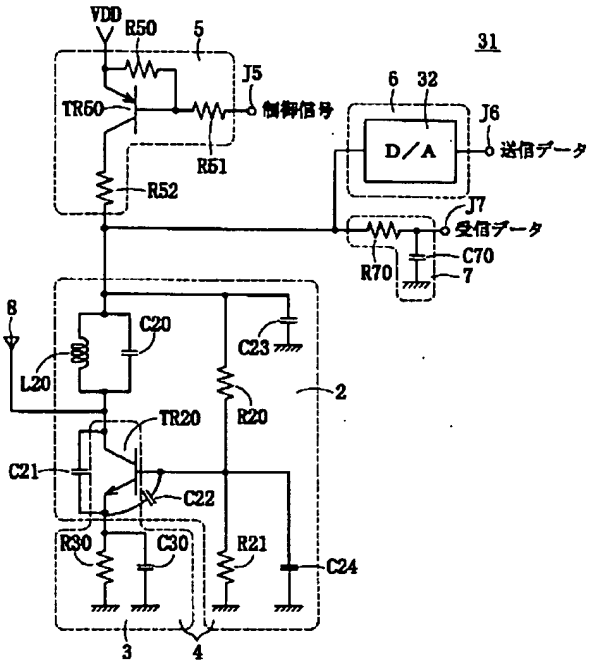
【図10】



【図5】



【図6】



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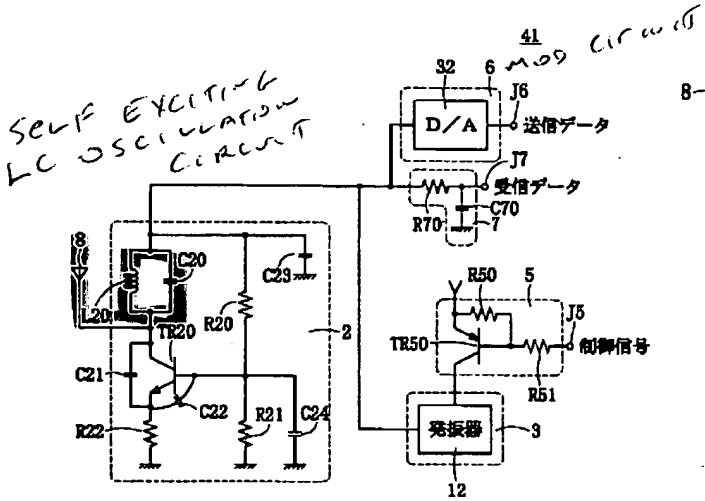

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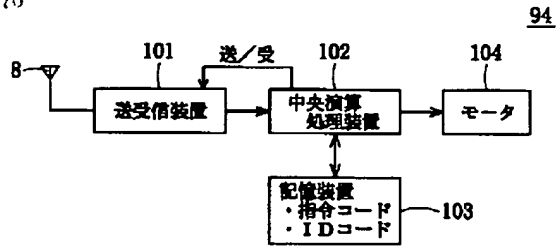

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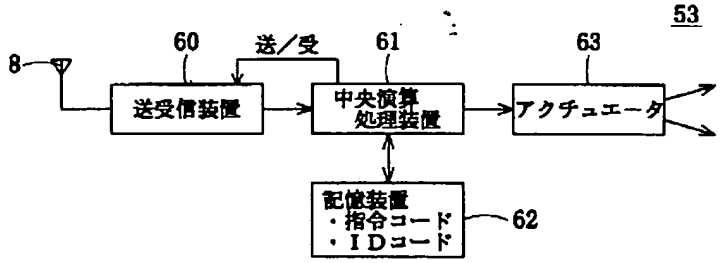

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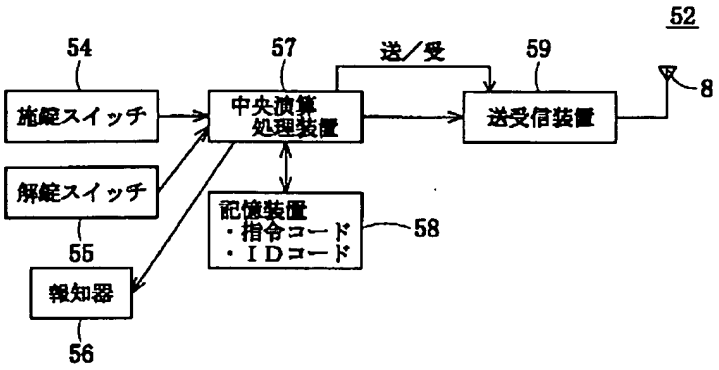

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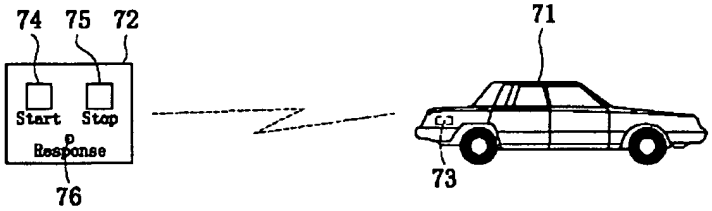

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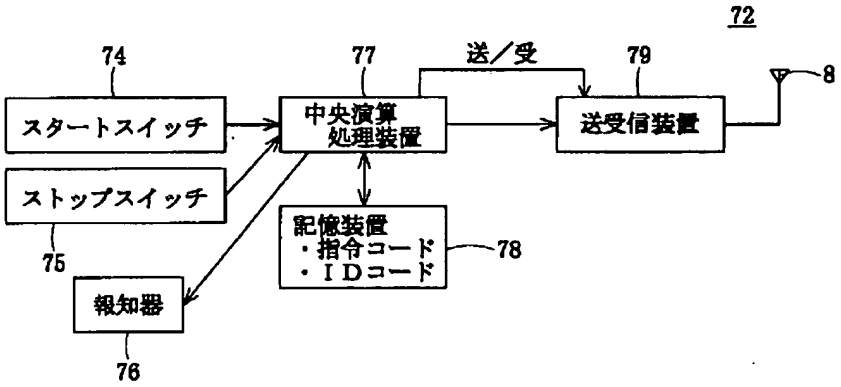

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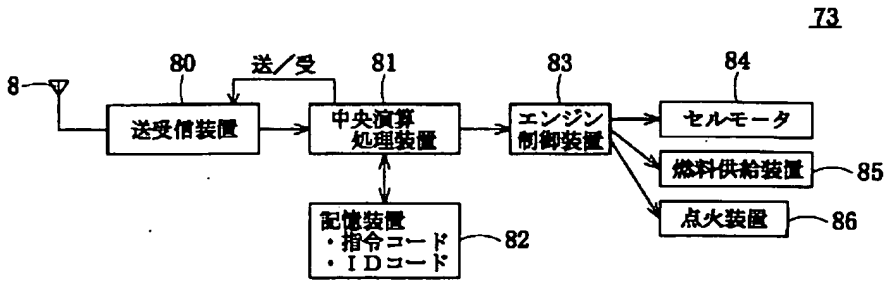

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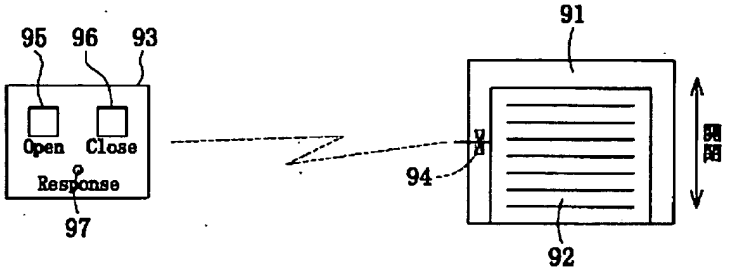

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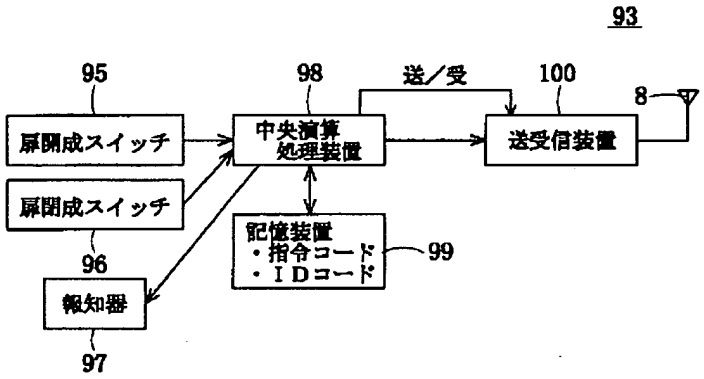

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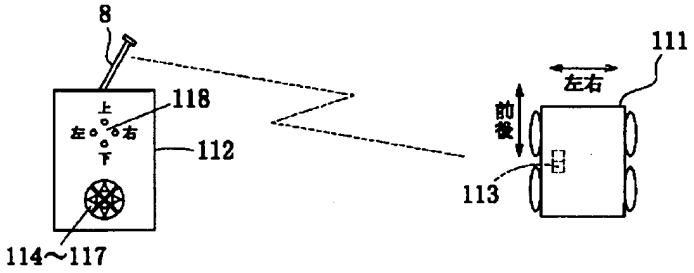

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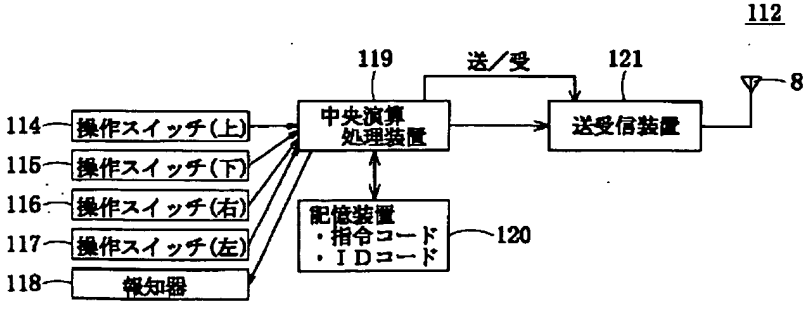
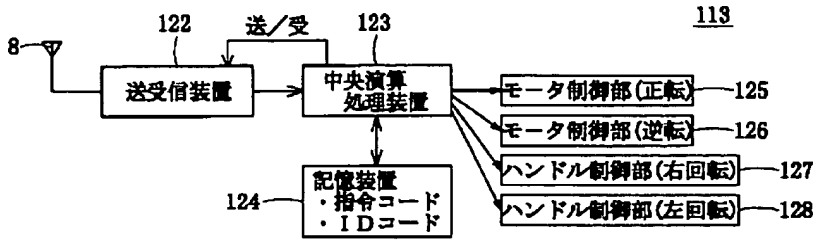


【図２１】



フロントページの続き

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Ｆターム(参考)　5K011 BA01 DA05 DA15 KA03
5K048 AA03 AA16 BA42 BA52 CA13 DB01 DC01 EA16 HA04 HA06 HA11

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a transmitter-receiver. It is related with the bidirectional wireless transmitter-receiver which performs a mutual communication link by the half duplex by single-line especially.
[0002]
[Description of the Prior Art] There are a full duplex transmission and half duplex as a correspondence procedure for making it transmit and receive among each Communication Bureau. A full duplex transmission performs bidirectional transmission and reception in parallel among each Communication Bureau using two channels. Half duplex makes two-way communication possible by communicating by turns by the single channel. Since the number of selector channels becomes two channels and the former full duplex transmission occupies a twice [half duplex] as many channel as this, it is disadvantageous in respect of a deployment of a frequency.
[0003] however, carry out for performing two-way communication by the full duplex transmission -- carry out for performing two-way communication by half duplex -- two lines, a sending circuit and a receiving circuit, are needed according to an individual for every Communication Bureau. For this reason, if it was in the former, the circuit magnitude of a transmitter-receiver became large and the miniaturization of a transmitter-receiver was barred.
[0004] Furthermore, in half duplex, since it has the composition of changing a sending circuit and a receiving circuit by turns at the predetermined spacing, and employing them, at the time of the change of a send action and reception actuation, the setup time until a sending circuit or a receiving circuit carries out normal actuation is needed, and there is a fault that a response worsens. Moreover, when it is made to energize to a sending circuit and a receiving circuit respectively also at the time of standby for the improvement in a response, power will always be supplied to two lines, a sending circuit and a receiving circuit, and there is a problem that power consumption becomes large.
[0005]
[Problem(s) to be Solved by the Invention] The place which it is made in order that this invention may solve an above-mentioned technical issue point, and is made into the object is by giving a transmitting function to a receiving circuit to enable the miniaturization of a transmitter-receiver, power-saving, and a high-speed change.
[0006]
[Description of the Invention] A super-regenerative reception means by which a transmitter-receiver according to claim 1 has a high frequency oscillator circuit and a quenching oscillator circuit, The quenching oscillation control means which controls ON of an oscillation of said quenching oscillator circuit, and OFF, A modulation means to modulate the signal of the predetermined frequency generated by said RF oscillator circuit, Have the antenna which transmits and receives a signal and said quenching oscillation control means is made to perform the quenching oscillation of said quenching oscillator circuit. While restoring to the modulated wave received with said antenna by that cause with said super-regenerative reception means and stopping the quenching oscillation of said quenching oscillator circuit by said quenching oscillation control

means The signal of the predetermined frequency which said RF oscillator circuit generates with said modulation means is modulated, and it is characterized by this transmitting a modulated wave from said antenna.

[0007] The transmitter-receiver of this invention carries out reception actuation by the super-regenerative reception circuit which consists of a high frequency oscillator circuit and a quenching oscillator circuit at the time of reception, stops a quenching oscillation at the time of transmission, and carries out a send action by the high frequency oscillator circuit and the modulation circuit. Therefore, a RF oscillator circuit can be made to be able to share in a transceiver function, and circuit magnitude of a transmitter-receiver can be made small.

[0008] Moreover, since a RF oscillator circuit is always in operating state at the time of reception at the time of transmission, it can shorten substantially stability time amount [required at the time of a transmission-and-reception change] of operation, and can raise the response of transmission and reception. Furthermore, since a transceiver function is shared and the RF oscillator circuit is always made into operating state, the dark current at the time of standby and the rush current at the time of a transmission-and-reception change are lost, and power-saving can be attained. Therefore, in dc-battery actuation, a cell can be life[super-]-ized.

[0009] Moreover, since the high frequency oscillator circuit is always maintained at operating state, nonstandard components, such as a high frequency switch, are not needed for the change of transmission and reception, but a transceiver change is attained easily.

[0010] Therefore, according to the transmitter-receiver of this invention, the optimal bidirectional radio communication equipment for the application of a pocket device can be offered.

[0011] A transmitter-receiver according to claim 2 a RF oscillator circuit and said RF oscillator circuit Moreover, ON and the RF oscillation control means which carries out off control, It has the antenna which transmits and receives a signal. At the time of reception actuation Carry out the quenching oscillation of said high frequency oscillation control means, and it restores to the modulated wave received with said antenna by that cause by said high frequency oscillator circuit and said high frequency oscillation control means. Moreover, at the time of a send action, the signal of the predetermined frequency which is made to carry out modulation actuation of said RF oscillation control means, and said RF oscillator circuit generates is modulated, and it is characterized by this transmitting a modulated wave from said antenna.

[0012] In the transmitter-receiver according to claim 2, the same function as the transmitter-receiver indicated to claim 1 is realized by changing a high frequency oscillator circuit to ON, and changing the high frequency oscillator circuit which carries out off control to a quenching oscillation and modulation actuation. Therefore, even if it is in the transmitter-receiver of claim 2, the effectiveness which can shorten substantially the stability time amount of operation at the time of the transmission-and-reception change which can make circuit magnitude of a transmitter-receiver small, and can raise the response of transmission and reception by sharing of a RF oscillator circuit that power-saving can be attained is done so.

[0013] Therefore, according to the transmitter-receiver of this invention, the optimal bidirectional radio communication equipment for the application of a pocket device can be offered.

[0014]
[Embodiment of the Invention] Drawing 1 is the block diagram showing the configuration of the transmitter-receiver 1 by 1 operation gestalt of this invention, and shows the bidirectional wireless transmitter-receiver by ASK (amplitude deviation modulation). This transmitter-receiver 1 is equipped with the self-excitation type super-regenerative reception circuit 4 which consists of an RF oscillator circuit 2 and a quenching oscillator circuit 3, the modulation circuit 6 which becomes irregular by controlling the RF oscillator circuit 2 for the quenching oscillator circuit 3 at ON, the quenching oscillation control circuit 5 which carries out off control, and the time of transmission, the low pass filter (low pass filter) 7, and the antenna 8 which transmits and receives a signal. Here, the RF oscillator circuit 2 is set up so that it may oscillate on the frequency which aligns with the carrier wave (subcarrier) of an input signal. The quenching oscillator circuit 3 operates so that the oscillation standup of the RF oscillator circuit 2 may be controlled. The quenching oscillation control circuit 5 changes circuit conditions by bias resistance, and controls the existence of a quenching oscillation. A modulation circuit 6 carries out adjustable [of the condition of RF oscillator circuit] according to transmit data, and performs modulation actuation. Moreover, although the antenna 8 uses the thing of transmission-and-reception common use, even if the object for transmission and the thing for reception are separate, it does not interfere.
[0015] First, reception actuation of this transmitter-receiver 1 is explained using drawing 2 (a), (b), and (c). The signal wave form of the input signal which drawing 2 (a) is caught with an antenna 8, and is inputted into the RF oscillator circuit 2 is shown, drawing 2 (b) shows the signal wave form at the time of the input signal of drawing 2 (a) inputted into the RF oscillator circuit 2 being outputted from the RF oscillator circuit 2, and drawing 2 (c) shows the wave after passing a low pass filter 7 further.
[0016] At the time of reception actuation, the quenching oscillation control circuit 5 is operating the quenching oscillator circuit 3, and a modulation circuit 6 has it in a idle state of operation. Now, the input signal [as / in the period T1 of drawing 2 (a)] received with the antenna 8 is the part of the amplitude 0 (code "0"), and suppose that the carrier wave is not inputted into the RF oscillator circuit 2 from an antenna 8. In this case, before RF oscillation fully rises in the RF oscillator circuit 2, RF oscillation is stopped by the quenching oscillation of the quenching oscillator circuit 3, and the next RF oscillation begins by it. For this reason, the signal outputted from the RF oscillator circuit 2 turns into a signal of the small amplitude as shown in drawing 2 (b), and a detection output serves as level "0" by passing a low pass filter 7.
[0017] on the other hand, it has the amplitude with the input signal [as / in the period T2 of drawing 2 (a)] which was caught with the antenna 8 and inputted into the RF oscillator circuit 2 -- **** (code "1") -- [drawing 2 (b)] to which RF oscillation starts quickly by the carrier wave in the RF oscillator circuit 2. If it lets RF oscillation signal generated in the RF oscillator circuit 2 pass to a low pass filter 7, as shown in drawing 2 (c), a detection output will serve as level "1."
[0018] Thus, in this transmitter-receiver 1, a detection output is obtained from an antenna 8 by letting start change of RF oscillation by the existence of the carrier wave (input signal) inputted into the RF oscillator circuit 2 pass to a low pass filter 7, and it outputs as received data which restored to this.
[0019] Next, the send action of a transmitter-receiver 1 is explained. At the time of a send

action, the quenching oscillation control circuit 5 is stopping the quenching oscillator circuit 3. a modulation circuit 6 is boiled according to "1" of the inputted transmit data (digital signal), and "0", and turns on and turns off the RF oscillator circuit 2, and the ASK modulated wave form of the carrier wave generated in the RF oscillator circuit 2 is acquired. The sending signal of this modulated wave form is emitted to space by the antenna 8.

[0020] An example of the concrete configuration of the bidirectional transmitter-receiver 1 of such an ASK modulation technique is shown in drawing 3 . The resonance circuit LC where the RF oscillator circuit 2 consists of the inductor L20 and capacitor C20 which were connected to the collector of a transistor TR20 and a transistor TR20 The capacitor C21 connected between the collector emitters of a transistor TR20, It is based on the deformation Colpitts oscillator circuit which consisted of capacitors C22 connected between the emitter bases of a transistor TR20. The electrical potential difference which pressured partially the upside electrical potential difference of a resonance circuit LC by the partial pressure resistance R20 and R21 is impressed to the base of a transistor TR20. A capacitor C23 is connected between the signal input side of a resonance circuit LC, and a gland, the capacitor C24 is connected between the base of a transistor TR20, and a gland, and the collector of a transistor TR20 is connected to the antenna 8. The quenching oscillator circuit 3 consists of loosening-and-tightening oscillator circuits which consist of the resistance R30 and the capacitor C30 which connected by making it juxtaposition between the transistor TR20 of the RF oscillator circuit 2 and common use, the emitter of a transistor TR20, and the gland. The quenching oscillation control circuit 5 consists of a digital transistor circuit which consists of the resistance R50 and base resistance R51 which were connected between a transistor TR50 and its emitter base, and resistance R52 of the high resistance prepared in the output section. The control signal of the quenching oscillation control circuit 5 is inputted into the input terminal J5 located in the end of base resistance R51, and the outgoing end is connected to the resonance circuit LC of the RF oscillator circuit 2. Moreover, the modulation circuit 6 consists of a digital transistor circuit which consists of the resistance R60 and base resistance R61 which were connected between a transistor TR60 and its emitter base, and resistance R62 of the low resistance prepared in the output section. Transmit data is inputted into the input terminal J6 located in the end of base resistance R61, and the outgoing end is connected to the resonance circuit LC of the RF oscillator circuit 2. Therefore, although it has the circuitry with same quenching oscillation control circuit 5 and modulation circuit 6, the low resistance R62 is used for the output section in the modulation circuit 6 to using the high resistance R52 for the output section in the quenching oscillation control circuit 5. A low pass filter 7 makes L form connection of resistance R70 and the capacitor C70, and is constituted, the input section of a low pass filter 7 is connected to the resonance circuit LC of the RF oscillator circuit 2, and the received data to which it restored are taken out from an output terminal J7.

[0021] When the circuit actuation at the time of reception actuation of this transmitter-receiver 1 is explained, it is as stating below. At the time of reception actuation, an input terminal J5 is set as a low level, a transistor TR50 is turned on, and the quenching oscillation control circuit 5 supplies a power source VDD to the RF oscillator circuit 2 and the quenching oscillator circuit 3. An input terminal J6 is set up high-level, a transistor TR60 becomes off, and a modulation circuit 6 suspends modulation actuation.

A detection output (received data) is obtained by letting the oscillation wave of the RF oscillator circuit 2 which changed with the input signals which superregenerative detection was performed by the RF oscillator circuit 2 and the quenching oscillator circuit 3, and received with the antenna 8 by them by this pass to a low pass filter 7.

[0022] Moreover, at the time of a send action, the terminal J5 of the quenching oscillation control circuit 5 is set as reverse high-level, and a transistor TR50 is turned OFF. On the other hand, although a modulation circuit 6 supplies a power source VDD to the RF oscillator circuit 2 and the quenching oscillator circuit 3 by inputting transmit data (negative logic) from a terminal J6, since resistance R62 is low resistance, the amount of feedback to a transistor TR20 decreases substantially except the resonance frequency decided with an inductor L20 and a capacitor C20. A quenching oscillation stops as the result, off control is carried out and ON and the sending signal by which the ASK modulation was carried out are sent out only for the RF oscillator circuit 2 by the sending signal from an antenna 8.

[0023] According to the transmitter-receiver 1 of such a configuration, since the RF oscillator circuit 2 can be shared in a transceiver function, the circuit of a transmitter-receiver 1 can be miniaturized. Moreover, since the transceiver circuit is shared and the RF oscillator circuit 2 is always in operating state, the setup time after a transceiver change can be shortened and a response also improves. Furthermore, since the dark current at the time of standby actuation becomes unnecessary and the rush current at the time of a transceiver change can also be reduced by sharing of a transceiver circuit, power-saving of a transmitter-receiver 1 can be attained. moreover, it has come out to also perform the change of a transceiver circuit, without using components with a special high frequency switch etc.

[0024] (2nd operation gestalt) Drawing 4 is the circuit diagram showing concretely the transmitter-receiver 11 by another operation gestalt of this invention, and uses the separate excitation type super-regenerative reception circuit 4 which controls the RF oscillator circuit 2 by external quenching oscillation. Since it is the same as the block diagram of drawing 1 if the transmitter-receiver 11 of this operation gestalt also expresses with a block diagram, it explains according to the concrete circuit diagram of drawing 4 .

[0025] The resonance circuit LC where the RF oscillator circuit 2 consists of the inductor L20 and capacitor C20 which were connected to the collector of a transistor TR20 and a transistor TR20 The capacitor C21 connected between the collector emitters of a transistor TR20, It is based on the deformation Colpitts oscillator circuit which consisted of capacitors C22 connected between the emitter bases of a transistor TR20. Emitter resistance R22 is connected with the emitter of a transistor TR20 between glands. The electrical potential difference which pressured partially the upside electrical potential difference of a resonance circuit LC by the partial pressure resistance R20 and R21 is impressed to the base of a transistor TR20. A capacitor C23 is connected between the signal input side of a resonance circuit LC, and a gland, the capacitor C24 is connected between the base of a transistor TR20, and a gland, and the collector of a transistor TR20 is connected to the antenna 8.

[0026] The quenching oscillator circuit 3 controls the RF oscillator circuit 2 from the exterior, with this operation gestalt, it realizes using the integrated circuit IC 12 for an oscillation, and that output is connected to the input section (resonance circuit LC) of the RF oscillator circuit 2. Moreover, the quenching oscillation control circuit 5 consists of

digital transistor circuits which consist of the resistance R50 and base resistance R51 which were connected between a transistor TR50 and its emitter base. The control signal of the quenching oscillation control circuit 5 is inputted into the input terminal J5 located in the end of base resistance R51, and the outgoing end (collector of a transistor TR50) is directly connected to it in the quenching oscillator circuit 3. Moreover, the modulation circuit 6 consists of a digital transistor circuit which consists of the resistance R60 and base resistance R61 which were connected between a transistor TR60 and its emitter base, and resistance R63 of the output section. Transmit data is inputted into the input terminal J6 of the end of base resistance R61, and the outgoing end is connected to the resonance circuit LC of the RF oscillator circuit 2. A low pass filter 7 makes L form connection of resistance R70 and the capacitor C70, and is constituted, the input section of a low pass filter 7 is connected to the resonance circuit LC of the RF oscillator circuit 2, and the received data to which it restored are taken out from an output terminal J7.

[0027] First, reception actuation of this transmitter-receiver 11 is explained. The quenching oscillation control circuit 5 is set as a low level in an input terminal J5 at the time of reception actuation, a transistor TR50 is turned on, and it supplies a power source VDD to the quenching oscillator circuit 3, and performs quenching control of the RF oscillator circuit 2. An input terminal J6 is set up high-level, a transistor TR60 becomes off, and a modulation circuit 6 suspends modulation actuation. Thereby, superregenerative detection is performed by the RF oscillator circuit 2 and the quenching oscillator circuit 3, and the received data detected by letting the oscillation wave of the RF oscillator circuit 2 which changed with the input signals which received with the antenna 8 pass to a low pass filter 7 are obtained.

[0028] Moreover, at the time of a send action, the input terminal J5 of the quenching oscillation control circuit 5 is set as reverse high-level, a transistor TR50 is turned OFF, and a halt of the quenching oscillator circuit 3 of operation is carried out. On the other hand, the RF oscillator circuit 2 is sent out, by inputting transmit data (negative logic) from an input terminal J6, off control is carried out and, as for a modulation circuit 6, ON and the sending signal by which the ASK modulation was carried out are sent out by the sending signal from an antenna 8.

[0029] Therefore, the same operation effectiveness as the 1st operation gestalt which used the self-excitation type super-regenerative reception circuit can be done so in this way also with the operation gestalt using a separate excitation type super-regenerative reception circuit.

[0030] (3rd operation gestalt) Drawing 5 is the concrete circuit diagram showing the bidirectional wireless transmitter-receiver 21 by still more nearly another operation gestalt of this invention. In this transmitter-receiver 21, at the time of reception actuation, RF oscillation control circuit 22 carries out superregenerative detection of the RF oscillator circuit 2 in operating as a quenching oscillator circuit 3 by the quenching oscillator circuit 3 and the modulation circuit 6 being constituted by ON and RF oscillation control circuit 22 which carries out off control, and RF oscillation control circuit 22 operates as a modulation circuit 6 at the time of a send action. This operation gestalt is explained according to the concrete circuit diagram of drawing 5 . Although RF oscillation control circuit 22 is constituted from drawing 5 by the microprocessor (CPU), it does not interfere, even if constituted by IC and the discrete line component.

[0031] The resonance circuit LC where the RF oscillator circuit 2 consists of the inductor

L20 and capacitor C20 which were connected to the collector of a transistor TR20 and a transistor TR20 The capacitor C21 connected between the collector emitters of a transistor TR20, It is based on the deformation Colpitts oscillator circuit which consisted of capacitors C22 connected between the emitter bases of a transistor TR20. Emitter resistance R22 is connected with the emitter of a transistor TR20 between glands. The electrical potential difference which pressured partially the upside electrical potential difference of a resonance circuit LC by the partial pressure resistance R20 and R21 is impressed to the base of a transistor TR20. A capacitor C23 is connected between the signal input side of a resonance circuit LC, and a gland, the capacitor C24 is connected between the base of a transistor TR20, and a gland, and the collector of a transistor TR20 is connected to the antenna 8. Moreover, the quenching oscillator circuit 3 and the modulation circuit 6 consist of RF oscillation control circuits 22 which consist of one CPU. A low pass filter 7 makes L form connection of resistance R70 and the capacitor C70, and is constituted, the input section of a low pass filter 7 is connected to the resonance circuit LC of the RF oscillator circuit 2, and the received data to which it restored are taken out from an output terminal J7.

[0032] First, the circuit actuation at the time of reception actuation is explained. RF oscillation control circuit 22 operates as a quenching oscillator circuit 3 at the time of reception actuation, outputs a quenching oscillation wave to the RF oscillator circuit 2 to it, and carries out quenching control of the RF oscillator circuit 2 at it. Superregenerative detection of the input signal which was caught with the antenna 8 by this and inputted into the RF oscillator circuit 2 is performed, and received data (detection output) are obtained by letting the oscillation wave which changed with input signals pass to a low pass filter 7.

[0033] Moreover, at the time of a send action, RF oscillation control circuit 22 operates as a modulation circuit 6. At the time of a send action, RF oscillation control circuit 22 outputs transmit data to the RF oscillator circuit 2, and carries out the ASK modulation of the sending signal for the RF oscillator circuit 2 ON and by carrying out off control, and the sending signal by which the ASK modulation was carried out is sent out from an antenna 8.

[0034] (4th operation gestalt) Drawing 6 is the concrete circuit diagram of the transmitter-receiver 31 by still more nearly another operation gestalt of this invention, and shows the bidirectional transmitter-receiver of the FSK (frequency shift transmission) method using the self-excitation type super-regenerative reception circuit 4. In this transmitter-receiver 31, since the configuration of the RF oscillator circuit 2, the quenching oscillator circuit 3, the quenching oscillation control circuit 5, and a low pass filter 7 is the same as that of what was shown in drawing 3 , it omits explanation. It is constituted by D/A converter (digital to analog converter) 32, and a modulation circuit 6 carries out potential control of the RF oscillator circuit 2 by outputting the voltage signal of V1 and V2 (V1<V2) to the RF oscillator circuit 2 according to "0" and "1" code of transmit data at the time of a send action, and by changing parasitic capacitance, a modulation circuit 6 changes an oscillation frequency to F1 and F2, and performs the FSK modulation. If two kinds of potentials V1 and V2 join the RF oscillator circuit 2, when the oscillating condition by the Vcb-Cob property of a transistor TR20 changes, a frequency will change and the FSK modulation of the sending signal will be carried out. In this way, the sending signal by which the FSK modulation was carried out is sent out

from an antenna 8.
[0035] Moreover, since the super-regenerative reception circuit 4 is a detector circuit in which the FSK reception is possible from the first, it can also receive and detect this transmitter-receiver 31 for the FSK modulating signal. That is, since electrical-potential-difference change deltaV=V2-V1 will appear in a reception output as shown in drawing 8 R> 8 if it has the frequency 1 receiving property as shown in drawing 7 and received frequency changes, the super-regenerative reception circuit 4 can receive and detect the FSK signal.
[0036] Drawing 9 is the concrete circuit diagram showing the bidirectional wireless transmitter-receiver 41 of the FSK modulation technique which used the separate excitation type super-regenerative reception circuit. It has the same configuration as the transmitter-receiver 11 which used the separate excitation type playback receiving circuit of drawing 4 R> 4 except modulation circuit 6, and this transmitter-receiver 41 constitutes a modulation circuit 6 with D/A converter 32 as well as the modulation circuit 6 of the transmitter-receiver 31 shown in drawing 6 , according to the same operation, it carries out the FSK modulation of the sending signal, and carries out FSK detection of the input signal.
[0037] (Application of a transmitter-receiver) Although the transmitter-receiver of this invention has various applicable fields, it explains some of them below. Drawing 10 - drawing 12 show the wireless door-lock equipment of the car 51 which used the transmitter-receiver of this invention. As shown in drawing 10 , this transmits a wireless sending signal to the controller (henceforth a slave station) 53 carried in the car 51 from the controller 52 by the side of actuation (henceforth a master station), and as it makes the door of a car 51 lock or unlock, it is giving the response acknowledgement function between the master station 52 and the slave station 53 with the control signal outputted from a slave station 53.
[0038] The master station 52 is equipped with the transmitter-receiver 59 concerning the annunciators 56, such as a lamp the locking switch 54, the release switch 55, and for a response check, and a buzzer, arithmetic and program control 57, storage 58, and this invention as shown in drawing 11 . If a deer is carried out and the locking switch 54 or the release switch 55 is operated by the operator, the locking instruction or release instruction by the switches 54 and 55 will be transmitted to arithmetic and program control 57. The arithmetic and program control 57 which received the instruction calls the command code according to the content of the instruction, and the ID code which performs discernment of a master station 52 from storage 58, and generates the sending signal incorporating these two codes. The transmitter-receiver 59 when the locking switch 54 or the release switch 55 is operated is controlled to work as a sending circuit with arithmetic and program control 57. And this sending signal is modulated to a RF signal with a transmitter-receiver 59, and it emanates to space from an antenna 8.
[0039] The slave station 53 carried in the car 51 is equipped with locking or the actuator 63 for carrying out release for the transmitter-receiver 60 concerning this invention, arithmetic and program control 61, a store 62, and door-lock equipment, as shown in drawing 12 . The transmitter-receiver 60 is controlled in the usual standby condition to work as a receiving circuit with arithmetic and program control 61. The sending signal sent to the slave station 53 from the master station 52 is caught by space propagation with the antenna 8 of a slave station 53, and command code and an ID code are detected with a

transmitter-receiver 60. The comparison test of the detected code is carried out to the code in storage 62 with arithmetic and program control 61. When an ID code is in agreement here, arithmetic and program control 61 outputs the control signal according to the content of command code to an actuator 63, it responds to command code and the door of a car 51 is made it to lock or unlock.

[0040] Subsequently, if a door checks locking or that release has been carried out as a command, the arithmetic and program control 61 of a slave station 53 outputs the acknowledge signal which controlled to commit a transmitter-receiver 60 as a sending circuit, and contained the cryptographic key (it may be the same as an ID code, and you may differ), will transmit the acknowledge signal modulated with the transmitter-receiver 60 from an antenna 8, and will answer.

[0041] It is controlled so that a transmitter-receiver 59 works as a receiving circuit with arithmetic and program control 57 immediately after operating the locking switch 54 or the release switch 55, and on the other hand sending out a sending signal from an antenna 8 in a master station 52. Therefore, if an acknowledge signal is sent from a slave station 53, a reply signal will be caught with the antenna 8 of a master station 52, and will be detected by the transmitter-receiver 59. If the arithmetic and program control 57 of a master station 52 carries out comparison collating of the detected acknowledge signal with the cryptographic key information in storage 58 and its code corresponds, the information told by the acknowledge signal will be transmitted to an operator with the annunciators 56, such as a lamp and a buzzer.

[0042] Thus, improvement in a high-speed response and crime prevention nature can be aimed at by using the transmitter-receivers 59 and 60 of this invention for wireless door-lock equipment, and including cryptographic key information in a reply signal further.

[0043] (The 2nd application) It is another application of the transmitter-receiver of this invention which is shown in drawing 13 - drawing 15 , and it is wireless engine starter equipment of a car 71. This gives the response acknowledgement function which returns a reply signal including the information which shows the condition of an engine or a change gear to a master station 72 from the slave station 73 in which it was carried by the car 71 in the wireless engine starter equipment which carries out remote control of start up and a halt of the engine of a car 71 by the wireless sending signal from the master station 72 which is an actuation side, as shown in drawing 13 .

[0044] The master station 72 is equipped with the transmitter-receiver 79 concerning the annunciators 76, such as a lamp the engine start switch 74, the engine-stop switch 75, and for a response check, and a buzzer, arithmetic and program control 77, storage 78, and this invention as shown in drawing 14 . If a deer is carried out and the engine start switch 74 or the engine-stop switch 75 is operated by the operator, the engine start instruction or engine-stop instruction by the switches 74 and 75 will be transmitted to arithmetic and program control 77. The arithmetic and program control 77 which received the instruction calls the command code according to the content of the instruction, and the ID code which performs discernment of a master station 72 from storage 78, and generates the sending signal incorporating these two codes. In the master station 72 which had the engine start switch 74 or the engine-stop switch 75 operated, the transmitter-receiver 79 is controlled by arithmetic and program control 77 to work as a sending circuit. And this sending signal is modulated to a RF signal with a transmitter-receiver 79, and it emanates to space from an antenna 8. In the master station 72 which the engine start switch 74 or

the engine-stop switch 75 was operated, and sent out the sending signal from the antenna 8, it changes so that a transmitter-receiver 79 may work as a receiving circuit with arithmetic and program control 77.

[0045] On the other hand, the slave station 73 carried in the car 71 is equipped with the transmitter-receiver 80 concerning this invention, arithmetic and program control 81, the store 82, a starter 84 and a fuel supply system 85, and the engine control system 83 that controls ignition 86 grade as shown in drawing 15 . In the usual standby condition, it is controlled by the slave station 73 so that a transmitter-receiver 80 works as a receiving circuit with arithmetic and program control 81. The sending signal sent to the slave station 73 from the master station 72 is caught by space propagation with the antenna 8 of a slave station 73, and the recovery of command code and an ID code is performed with a transmitter-receiver 80. The comparison test of the code to which it restored is carried out to the code in storage 82 with arithmetic and program control 81. When an ID code is in agreement here, arithmetic and program control 81 outputs the control signal according to the content of command code to an engine control system 83, and makes a starter 84, a fuel supply system 85, and ignition 86 grade control according to command code.

[0046] Subsequently, arithmetic and program control 81 detects that engine start up or an engine shutdown was successful or that one of actuation went wrong by failure of an engine and a change gear. Subsequently, change arithmetic and program control 81 so that a transmitter-receiver 80 may be committed as a sending circuit, and it makes a reply signal including the information which shows a success or failure in control action output from a transmitter-receiver 80, and answers by sending out a reply signal through an antenna 8.

[0047] If this reply signal is received by the master station 72, it will know that the arithmetic and program control 79 of a master station 72 cannot put an engine into operation based on the information included in the reply signal because of failure of having succeeded in engine start up or an engine shutdown or an engine, or a change gear etc., and a flash condition of a lamp, a difference in the tone of the sound of a buzzer, etc. in an annunciator 76 will report this.

[0048] Thus, when it fails by adopting the transmitter-receivers 79 and 80 of this invention as wireless engine starter equipment, and including failure information etc. in a reply signal further, what is depended on failure of transmission and reception, and the thing to depend on engine failure can be reported to an operator. Moreover, if the transmitter-receivers 79 and 80 of this invention are used for wireless engine starter equipment, since a master station 72 can be miniaturized, the portability of a master station 72 improves. Moreover, if the transmitter-receivers 79 and 80 of this invention are used, since power consumption can be made small, the cell of a master station 72 can be made to be able to withstand long use, changing-battery frequency can be reduced, and consumption of a mounted dc-battery can be reduced even in a slave station 73. Furthermore, since the condition of a car 71 can be checked in the master station 72 (annunciator 76) at hand, the soundness and the safety of actuation increase and the insecurity of the operator whether the engine has started actually can be swept away.

[0049] (The 3rd application) Drawing 16 - drawing 18 are still more nearly another applications, and show wireless garage door opening close equipment. This gives a response acknowledgement function to the wireless garage door opening close equipment which opens and closes the door (shutter) 92 of a garage 91 by the wireless sending

signal from the master station 93 which is an actuation side, as shown in drawing 16 .
[0050] The master station 93 is equipped with the transmitter-receiver 100 concerning the annunciators 97, such as a lamp the door Kaisei switch 95, the door closing switch 96, and for a response check, and a buzzer, arithmetic and program control 98, storage 99, and this invention as shown in drawing 17 . If a deer is carried out and the door Kaisei switch 95 or the door closing switch 96 is operated by the operator, the door Kaisei instruction or door closing instruction by the switches 95 and 96 will be transmitted to arithmetic and program control 98. The arithmetic and program control 98 which received the instruction calls the command code according to the content of the instruction, and the ID code which performs discernment of a master station 93 from storage 99, and generates the sending signal incorporating these two codes. If the door Kaisei switch 95 or the door closing switch 96 is operated, arithmetic and program control 98 will be controlled to commit a transmitter-receiver 100 as a sending circuit. And this sending signal is modulated to a RF signal with a transmitter-receiver 100, and it emanates to space from an antenna 8. In the master station 93 which the door Kaisei switch 95 or the door closing switch 96 was operated, and sent out the sending signal from the antenna 8, it changes so that a transmitter-receiver 100 may work as a receiving circuit with arithmetic and program control 98.
[0051] On the other hand, the slave station 94 installed in the garage 91 is equipped with Kaisei or the motor 104 for making it close for the transmitter-receiver 101 concerning this invention, arithmetic and program control 102, the store 103, and the garage door 92, as shown in drawing 18 . Moreover, the transmitter-receiver 101 is controlled by the slave station 94 in a standby condition to work as a receiving circuit with arithmetic and program control 102. The sending signal sent to the slave station 94 from the master station 93 is caught by space propagation with the antenna 8 of a slave station 94, and detection of command code and an ID code is performed with a transmitter-receiver 101. The comparison test of the detected code is carried out to the code in storage 103 with arithmetic and program control 102. If an ID code is in agreement here, arithmetic and program control 102 will output the control signal according to the content of command code to a motor 104, and will open or close the garage door 92 according to command code.
[0052] Subsequently, if a door checks locking or that release has been carried out as a command, will change arithmetic and program control 102 so that a transmitter-receiver 101 may be committed as a sending circuit, and it will make a reply signal including the information showing the condition of the garage door 92, or cryptographic key information output from a transmitter-receiver 101, and will transmit a reply signal to a master station 93 through an antenna 8.
[0053] An annunciator 97 reports a master station 93 collating cryptographic key information, if a reply signal is received immediately after sending a sending signal, and the garage door 92 opening it based on the information about the condition of the garage door 92 contained in a reply signal when cryptographic key information is in agreement, or having closed it.
[0054] Thus, the effectiveness of improvement in a high-speed response and crime prevention nature can be acquired by adopting the transmitter-receivers 100 and 101 of this invention as wireless garage door opening close equipment, and including cryptographic key information in a reply signal further. Moreover, since a master station

93 can be miniaturized by using the transmitter-receivers 100 and 101 of this invention, the portability of the master station 93 which is an actuation side improves. Moreover, since power consumption can be lessened by using the transmitter-receivers 100 and 101 of this invention, cell consumption of a master station 93 is suppressed, changing-battery frequency is lessened, and consumption of a mounted dc-battery can be reduced in a slave station 94 side. Furthermore, since the switching condition of a garage 91 can be checked in the master station 93 at hand, grasp of the closing motion situation of the garage door 92 is attained also in the situation that closing motion of a direct check is impossible in night etc.

[0055] (The 4th application) Drawing 19 - drawing 21 are still more nearly another applications, and show the telecontrol system for operating a device by remote control. This gives a response acknowledgement function to the telecontrol system for moving the devices 111, such as a car in the location left by the wireless sending signal from the master station 112 which is an actuation side, vertically and horizontally, as shown in drawing 19 .

[0056] The master station 112 is equipped with the transmitter-receiver 121 concerning the annunciators 118, such as the actuation switch 114 of top migration, the actuation switch 115 of bottom migration, the actuation switch 116 of right translation, the actuation switch 117 of left translation, a lamp for a response check, and a buzzer, arithmetic and program control 119, storage 120, and this invention as shown in drawing 17 . If a deer is carried out and one actuation switches 114-117 of vertical and horizontal are operated by the operator, the control instruction by the actuation switches 114-117 will be told to arithmetic and program control 119. The arithmetic and program control 119 which received the instruction calls the command code according to the content of the instruction, and the ID code which performs discernment of a master station 112 from storage 120, and generates the sending signal incorporating these two codes. If one of the actuation switches 114-117 is operated, arithmetic and program control 119 will be controlled to commit a transmitter-receiver 121 as a sending circuit. And this sending signal is modulated to a RF signal with a transmitter-receiver 121, and it emanates to space from an antenna 8. In the master station 112 which one of the actuation switches 114-117 was operated, and sent out the sending signal from the antenna 8, it changes so that a transmitter-receiver 121 may work as a receiving circuit with arithmetic and program control 119.

[0057] On the other hand, the slave station 113 carried in the device 111 As shown in drawing 21 The motor control section 126 for reversing the motor control section 125 for rotating the transmitter-receiver 122 concerning this invention, arithmetic and program control 123, storage 124, and a motor normally, and moving a device 111 upwards, and a motor, and moving a device 111 below, and a handle It has the handle control section 128 for carrying out the RLC of the handle control section 127 for carrying out a RRC and moving a device 111 to the right, and the handle, and moving a device 111 to the left. Moreover, the transmitter-receiver 122 is controlled by the slave station 113 in a standby condition to work as a receiving circuit with arithmetic and program control 123. The sending signal sent to the slave station 113 from the master station 112 is caught by space propagation with the antenna 8 of a slave station 113, and detection of command code and an ID code is performed with a transmitter-receiver 122. The comparison test of the detected code is carried out to the code in storage 124 with arithmetic and program

control 123. If an ID code is in agreement here, arithmetic and program control 213 will output the control signal according to the content of command code to the motor control sections 125 and 126 or the handle control sections 127 and 128, and will move a device 111 vertically and horizontally according to command code.
[0058] Subsequently, if it checks that the device 111 has moved as a command, will change the arithmetic and program control 123 of a slave station 113 so that a transmitter-receiver 122 may be committed as a sending circuit, and it will make a reply signal including the information showing the migration condition of a device 111 output from a transmitter-receiver 122, and will transmit a reply signal to a master station 112 through an antenna 8.
[0059] A master station 112 will report a decode child and the migration condition of a device for the information about the migration condition of the device 111 contained in a reply signal with an annunciator 97, if a reply signal is received immediately after sending out a sending signal.
[0060] Thus, responsibility can be raised by adopting the transmitter-receiver of this invention as a telecontrol system, and including cryptographic key information in a reply signal further. Furthermore, since a master station 112 can be miniaturized by using the transmitter-receivers 121 and 122 of this invention, the portability of the master station 112 which is an actuation side can be raised. Moreover, since power consumption can be lessened by using the transmitter-receivers 121 and 122 of this invention, cell consumption of a master station 112 is suppressed and changing-battery frequency can be lessened. Furthermore, since the actuation condition of a device 111 can be checked in the master station 112 at hand, it can be operated grasping an actuation condition also in the situation that the device 111 used as the object for actuation cannot be seen directly, and the soundness and dependability of actuation can be raised.
DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a transmitter-receiver. It is related with the bidirectional wireless transmitter-receiver which performs a mutual communication link by the half duplex by single-line especially.
[0002]
[Description of the Prior Art] There are a full duplex transmission and half duplex as a correspondence procedure for making it transmit and receive among each Communication Bureau. A full duplex transmission performs bidirectional transmission and reception in parallel among each Communication Bureau using two channels. Half duplex makes two-way communication possible by communicating by turns by the single channel. Since the number of selector channels becomes two channels and the former full duplex transmission occupies a twice [half duplex] as many channel as this, it is disadvantageous in respect of a deployment of a frequency.
[0003] however, carry out for performing two-way communication by the full duplex transmission -- carry out for performing two-way communication by half duplex -- two lines, a sending circuit and a receiving circuit, are needed according to an individual for every Communication Bureau. For this reason, if it was in the former, the circuit magnitude of a transmitter-receiver became large and the miniaturization of a transmitter-

receiver was barred.
[0004] Furthermore, in half duplex, since it has the composition of changing a sending circuit and a receiving circuit by turns at the predetermined spacing, and employing them, at the time of the change of a send action and reception actuation, the setup time until a sending circuit or a receiving circuit carries out normal actuation is needed, and there is a fault that a response worsens. Moreover, when it is made to energize to a sending circuit and a receiving circuit respectively also at the time of standby for the improvement in a response, power will always be supplied to two lines, a sending circuit and a receiving circuit, and there is a problem that power consumption becomes large.
[0005]
[Problem(s) to be Solved by the Invention] The place which it is made in order that this invention may solve an above-mentioned technical issue point, and is made into the object is by giving a transmitting function to a receiving circuit to enable the miniaturization of a transmitter-receiver, power-saving, and a high-speed change.
[0006]
[Description of the Invention] A super-regenerative reception means by which a transmitter-receiver according to claim 1 has a high frequency oscillator circuit and a quenching oscillator circuit, The quenching oscillation control means which controls ON of an oscillation of said quenching oscillator circuit, and OFF, A modulation means to modulate the signal of the predetermined frequency generated by said RF oscillator circuit, Have the antenna which transmits and receives a signal and said quenching oscillation control means is made to perform the quenching oscillation of said quenching oscillator circuit. While restoring to the modulated wave received with said antenna by that cause with said super-regenerative reception means and stopping the quenching oscillation of said quenching oscillator circuit by said quenching oscillation control means The signal of the predetermined frequency which said RF oscillator circuit generates with said modulation means is modulated, and it is characterized by this transmitting a modulated wave from said antenna.
[0007] The transmitter-receiver of this invention carries out reception actuation by the super-regenerative reception circuit which consists of a high frequency oscillator circuit and a quenching oscillator circuit at the time of reception, stops a quenching oscillation at the time of transmission, and carries out a send action by the high frequency oscillator circuit and the modulation circuit. Therefore, a RF oscillator circuit can be made to be able to share in a transceiver function, and circuit magnitude of a transmitter-receiver can be made small.
[0008] Moreover, since a RF oscillator circuit is always in operating state at the time of reception at the time of transmission, it can shorten substantially stability time amount [required at the time of a transmission-and-reception change] of operation, and can raise the response of transmission and reception. Furthermore, since a transceiver function is shared and the RF oscillator circuit is always made into operating state, the dark current at the time of standby and the rush current at the time of a transmission-and-reception change are lost, and power-saving can be attained. Therefore, in dc-battery actuation, a cell can be life[super-]-ized.
[0009] Moreover, since the high frequency oscillator circuit is always maintained at operating state, nonstandard components, such as a high frequency switch, are not needed for the change of transmission and reception, but a transceiver change is attained easily.

[0010] Therefore, according to the transmitter-receiver of this invention, the optimal bidirectional radio communication equipment for the application of a pocket device can be offered.
[0011] A transmitter-receiver according to claim 2 a RF oscillator circuit and said RF oscillator circuit Moreover, ON and the RF oscillation control means which carries out off control, It has the antenna which transmits and receives a signal. At the time of reception actuation Carry out the quenching oscillation of said high frequency oscillation control means, and it restores to the modulated wave received with said antenna by that cause by said high frequency oscillator circuit and said high frequency oscillation control means. Moreover, at the time of a send action, the signal of the predetermined frequency which is made to carry out modulation actuation of said RF oscillation control means, and said RF oscillator circuit generates is modulated, and it is characterized by this transmitting a modulated wave from said antenna.
[0012] In the transmitter-receiver according to claim 2, the same function as the transmitter-receiver indicated to claim 1 is realized by changing a high frequency oscillator circuit to ON, and changing the high frequency oscillator circuit which carries out off control to a quenching oscillation and modulation actuation. Therefore, even if it is in the transmitter-receiver of claim 2, the effectiveness which can shorten substantially the stability time amount of operation at the time of the transmission-and-reception change which can make circuit magnitude of a transmitter-receiver small, and can raise the response of transmission and reception by sharing of a RF oscillator circuit that power-saving can be attained is done so.
[0013] Therefore, according to the transmitter-receiver of this invention, the optimal bidirectional radio communication equipment for the application of a pocket device can be offered.
[0014]
[Embodiment of the Invention] Drawing 1 is the block diagram showing the configuration of the transmitter-receiver 1 by 1 operation gestalt of this invention, and shows the bidirectional wireless transmitter-receiver by ASK (amplitude deviation modulation). This transmitter-receiver 1 is equipped with the self-excitation type super-regenerative reception circuit 4 which consists of an RF oscillator circuit 2 and a quenching oscillator circuit 3, the modulation circuit 6 which becomes irregular by controlling the RF oscillator circuit 2 for the quenching oscillator circuit 3 at ON, the quenching oscillation control circuit 5 which carries out off control, and the time of transmission, the low pass filter (low pass filter) 7, and the antenna 8 which transmits and receives a signal. Here, the RF oscillator circuit 2 is set up so that it may oscillate on the frequency which aligns with the carrier wave (subcarrier) of an input signal. The quenching oscillator circuit 3 operates so that the oscillation standup of the RF oscillator circuit 2 may be controlled. The quenching oscillation control circuit 5 changes circuit conditions by bias resistance, and controls the existence of a quenching oscillation. A modulation circuit 6 carries out adjustable [of the condition of RF oscillator circuit] according to transmit data, and performs modulation actuation. Moreover, although the antenna 8 uses the thing of transmission-and-reception common use, even if the object for transmission and the thing for reception are separate, it does not interfere.
[0015] First, reception actuation of this transmitter-receiver 1 is explained using drawing 2 (a), (b), and (c). The signal wave form of the input signal which drawing 2 (a) is caught

with an antenna 8, and is inputted into the RF oscillator circuit 2 is shown, drawing 2 (b) shows the signal wave form at the time of the input signal of drawing 2 (a) inputted into the RF oscillator circuit 2 being outputted from the RF oscillator circuit 2, and drawing 2 (c) shows the wave after passing a low pass filter 7 further.

[0016] At the time of reception actuation, the quenching oscillation control circuit 5 is operating the quenching oscillator circuit 3, and a modulation circuit 6 has it in a idle state of operation. Now, the input signal [as / in the period T1 of drawing 2 (a)] received with the antenna 8 is the part of the amplitude 0 (code "0"), and suppose that the carrier wave is not inputted into the RF oscillator circuit 2 from an antenna 8. In this case, before RF oscillation fully rises in the RF oscillator circuit 2, RF oscillation is stopped by the quenching oscillation of the quenching oscillator circuit 3, and the next RF oscillation begins by it. For this reason, the signal outputted from the RF oscillator circuit 2 turns into a signal of the small amplitude as shown in drawing 2 (b), and a detection output serves as level "0" by passing a low pass filter 7.

[0017] on the other hand, it has the amplitude with the input signal [as / in the period T2 of drawing 2 (a)] which was caught with the antenna 8 and inputted into the RF oscillator circuit 2 -- **** (code "1") -- [drawing 2 (b)] to which RF oscillation starts quickly by the carrier wave in the RF oscillator circuit 2. If it lets RF oscillation signal generated in the RF oscillator circuit 2 pass to a low pass filter 7, as shown in drawing 2 (c), a detection output will serve as level "1."

[0018] Thus, in this transmitter-receiver 1, a detection output is obtained from an antenna 8 by letting start change of RF oscillation by the existence of the carrier wave (input signal) inputted into the RF oscillator circuit 2 pass to a low pass filter 7, and it outputs as received data which restored to this.

[0019] Next, the send action of a transmitter-receiver 1 is explained. At the time of a send action, the quenching oscillation control circuit 5 is stopping the quenching oscillator circuit 3. a modulation circuit 6 is boiled according to "1" of the inputted transmit data (digital signal), and "0", and turns on and turns off the RF oscillator circuit 2, and the ASK modulated wave form of the carrier wave generated in the RF oscillator circuit 2 is acquired. The sending signal of this modulated wave form is emitted to space by the antenna 8.

[0020] An example of the concrete configuration of the bidirectional transmitter-receiver 1 of such an ASK modulation technique is shown in drawing 3 . The resonance circuit LC where the RF oscillator circuit 2 consists of the inductor L20 and capacitor C20 which were connected to the collector of a transistor TR20 and a transistor TR20 The capacitor C21 connected between the collector emitters of a transistor TR20, It is based on the deformation Colpitts oscillator circuit which consisted of capacitors C22 connected between the emitter bases of a transistor TR20. The electrical potential difference which pressured partially the upside electrical potential difference of a resonance circuit LC by the partial pressure resistance R20 and R21 is impressed to the base of a transistor TR20. A capacitor C23 is connected between the signal input side of a resonance circuit LC, and a gland, the capacitor C24 is connected between the base of a transistor TR20, and a gland, and the collector of a transistor TR20 is connected to the antenna 8. The quenching oscillator circuit 3 consists of loosening-and-tightening oscillator circuits which consist of the resistance R30 and the capacitor C30 which connected by making it juxtaposition between the transistor TR20 of the RF oscillator

circuit 2 and common use, the emitter of a transistor TR20, and the gland. The quenching oscillation control circuit 5 consists of a digital transistor circuit which consists of the resistance R50 and base resistance R51 which were connected between a transistor TR50 and its emitter base, and resistance R52 of the high resistance prepared in the output section. The control signal of the quenching oscillation control circuit 5 is inputted into the input terminal J5 located in the end of base resistance R51, and the outgoing end is connected to the resonance circuit LC of the RF oscillator circuit 2. Moreover, the modulation circuit 6 consists of a digital transistor circuit which consists of the resistance R60 and base resistance R61 which were connected between a transistor TR60 and its emitter base, and resistance R62 of the low resistance prepared in the output section. Transmit data is inputted into the input terminal J6 located in the end of base resistance R61, and the outgoing end is connected to the resonance circuit LC of the RF oscillator circuit 2. Therefore, although it has the circuitry with same quenching oscillation control circuit 5 and modulation circuit 6, the low resistance R62 is used for the output section in the modulation circuit 6 to using the high resistance R52 for the output section in the quenching oscillation control circuit 5. A low pass filter 7 makes L form connection of resistance R70 and the capacitor C70, and is constituted, the input section of a low pass filter 7 is connected to the resonance circuit LC of the RF oscillator circuit 2, and the received data to which it restored are taken out from an output terminal J7.

[0021] When the circuit actuation at the time of reception actuation of this transmitter-receiver 1 is explained, it is as stating below. At the time of reception actuation, an input terminal J5 is set as a low level, a transistor TR50 is turned on, and the quenching oscillation control circuit 5 supplies a power source VDD to the RF oscillator circuit 2 and the quenching oscillator circuit 3. An input terminal J6 is set up high-level, a transistor TR60 becomes off, and a modulation circuit 6 suspends modulation actuation. A detection output (received data) is obtained by letting the oscillation wave of the RF oscillator circuit 2 which changed with the input signals which superregenerative detection was performed by the RF oscillator circuit 2 and the quenching oscillator circuit 3, and received with the antenna 8 by them by this pass to a low pass filter 7.

[0022] Moreover, at the time of a send action, the terminal J5 of the quenching oscillation control circuit 5 is set as reverse high-level, and a transistor TR50 is turned OFF. On the other hand, although a modulation circuit 6 supplies a power source VDD to the RF oscillator circuit 2 and the quenching oscillator circuit 3 by inputting transmit data (negative logic) from a terminal J6, since resistance R62 is low resistance, the amount of feedback to a transistor TR20 decreases substantially except the resonance frequency decided with an inductor L20 and a capacitor C20. A quenching oscillation stops as the result, off control is carried out and ON and the sending signal by which the ASK modulation was carried out are sent out only for the RF oscillator circuit 2 by the sending signal from an antenna 8.

[0023] According to the transmitter-receiver 1 of such a configuration, since the RF oscillator circuit 2 can be shared in a transceiver function, the circuit of a transmitter-receiver 1 can be miniaturized. Moreover, since the transceiver circuit is shared and the RF oscillator circuit 2 is always in operating state, the setup time after a transceiver change can be shortened and a response also improves. Furthermore, since the dark current at the time of standby actuation becomes unnecessary and the rush current at the time of a transceiver change can also be reduced by sharing of a transceiver circuit,

power-saving of a transmitter-receiver 1 can be attained. moreover, it has come out to also perform the change of a transceiver circuit, without using components with a special high frequency switch etc.

[0024] (2nd operation gestalt) Drawing 4 is the circuit diagram showing concretely the transmitter-receiver 11 by another operation gestalt of this invention, and uses the separate excitation type super-regenerative reception circuit 4 which controls the RF oscillator circuit 2 by external quenching oscillation. Since it is the same as the block diagram of drawing 1 if the transmitter-receiver 11 of this operation gestalt also expresses with a block diagram, it explains according to the concrete circuit diagram of drawing 4 .

[0025] The resonance circuit LC where the RF oscillator circuit 2 consists of the inductor L20 and capacitor C20 which were connected to the collector of a transistor TR20 and a transistor TR20 The capacitor C21 connected between the collector emitters of a transistor TR20, It is based on the deformation Colpitts oscillator circuit which consisted of capacitors C22 connected between the emitter bases of a transistor TR20. Emitter resistance R22 is connected with the emitter of a transistor TR20 between glands. The electrical potential difference which pressured partially the upside electrical potential difference of a resonance circuit LC by the partial pressure resistance R20 and R21 is impressed to the base of a transistor TR20. A capacitor C23 is connected between the signal input side of a resonance circuit LC, and a gland, the capacitor C24 is connected between the base of a transistor TR20, and a gland, and the collector of a transistor TR20 is connected to the antenna 8.

[0026] The quenching oscillator circuit 3 controls the RF oscillator circuit 2 from the exterior, with this operation gestalt, it realizes using the integrated circuit IC 12 for an oscillation, and that output is connected to the input section (resonance circuit LC) of the RF oscillator circuit 2. Moreover, the quenching oscillation control circuit 5 consists of digital transistor circuits which consist of the resistance R50 and base resistance R51 which were connected between a transistor TR50 and its emitter base. The control signal of the quenching oscillation control circuit 5 is inputted into the input terminal J5 located in the end of base resistance R51, and the outgoing end (collector of a transistor TR50) is directly connected to it in the quenching oscillator circuit 3. Moreover, the modulation circuit 6 consists of a digital transistor circuit which consists of the resistance R60 and base resistance R61 which were connected between a transistor TR60 and its emitter base, and resistance R63 of the output section. Transmit data is inputted into the input terminal J6 of the end of base resistance R61, and the outgoing end is connected to the resonance circuit LC of the RF oscillator circuit 2. A low pass filter 7 makes L form connection of resistance R70 and the capacitor C70, and is constituted, the input section of a low pass filter 7 is connected to the resonance circuit LC of the RF oscillator circuit 2, and the received data to which it restored are taken out from an output terminal J7.

[0027] First, reception actuation of this transmitter-receiver 11 is explained. The quenching oscillation control circuit 5 is set as a low level in an input terminal J5 at the time of reception actuation, a transistor TR50 is turned on, and it supplies a power source VDD to the quenching oscillator circuit 3, and performs quenching control of the RF oscillator circuit 2. An input terminal J6 is set up high-level, a transistor TR60 becomes off, and a modulation circuit 6 suspends modulation actuation. Thereby, superregenerative detection is performed by the RF oscillator circuit 2 and the quenching oscillator circuit 3, and the received data detected by letting the oscillation wave of the

RF oscillator circuit 2 which changed with the input signals which received with the antenna 8 pass to a low pass filter 7 are obtained.
[0028] Moreover, at the time of a send action, the input terminal J5 of the quenching oscillation control circuit 5 is set as reverse high-level, a transistor TR50 is turned OFF, and a halt of the quenching oscillator circuit 3 of operation is carried out. On the other hand, the RF oscillator circuit 2 is sent out, by inputting transmit data (negative logic) from an input terminal J6, off control is carried out and, as for a modulation circuit 6, ON and the sending signal by which the ASK modulation was carried out are sent out by the sending signal from an antenna 8.
[0029] Therefore, the same operation effectiveness as the 1st operation gestalt which used the self-excitation type super-regenerative reception circuit can be done so in this way also with the operation gestalt using a separate excitation type super-regenerative reception circuit.
[0030] (3rd operation gestalt) Drawing 5 is the concrete circuit diagram showing the bidirectional wireless transmitter-receiver 21 by still more nearly another operation gestalt of this invention. In this transmitter-receiver 21, at the time of reception actuation, RF oscillation control circuit 22 carries out superregenerative detection of the RF oscillator circuit 2 in operating as a quenching oscillator circuit 3 by the quenching oscillator circuit 3 and the modulation circuit 6 being constituted by ON and RF oscillation control circuit 22 which carries out off control, and RF oscillation control circuit 22 operates as a modulation circuit 6 at the time of a send action. This operation gestalt is explained according to the concrete circuit diagram of drawing 5 . Although RF oscillation control circuit 22 is constituted from drawing 5 by the microprocessor (CPU), it does not interfere, even if constituted by IC and the discrete line component.
[0031] The resonance circuit LC where the RF oscillator circuit 2 consists of the inductor L20 and capacitor C20 which were connected to the collector of a transistor TR20 and a transistor TR20 The capacitor C21 connected between the collector emitters of a transistor TR20, It is based on the deformation Colpitts oscillator circuit which consisted of capacitors C22 connected between the emitter bases of a transistor TR20. Emitter resistance R22 is connected with the emitter of a transistor TR20 between glands. The electrical potential difference which pressured partially the upside electrical potential difference of a resonance circuit LC by the partial pressure resistance R20 and R21 is impressed to the base of a transistor TR20. A capacitor C23 is connected between the signal input side of a resonance circuit LC, and a gland, the capacitor C24 is connected between the base of a transistor TR20, and a gland, and the collector of a transistor TR20 is connected to the antenna 8. Moreover, the quenching oscillator circuit 3 and the modulation circuit 6 consist of RF oscillation control circuits 22 which consist of one CPU. A low pass filter 7 makes L form connection of resistance R70 and the capacitor C70, and is constituted, the input section of a low pass filter 7 is connected to the resonance circuit LC of the RF oscillator circuit 2, and the received data to which it restored are taken out from an output terminal J7.
[0032] First, the circuit actuation at the time of reception actuation is explained. RF oscillation control circuit 22 operates as a quenching oscillator circuit 3 at the time of reception actuation, outputs a quenching oscillation wave to the RF oscillator circuit 2 to it, and carries out quenching control of the RF oscillator circuit 2 at it. Superregenerative detection of the input signal which was caught with the antenna 8 by this and inputted

into the RF oscillator circuit 2 is performed, and received data (detection output) are obtained by letting the oscillation wave which changed with input signals pass to a low pass filter 7.

[0033] Moreover, at the time of a send action, RF oscillation control circuit 22 operates as a modulation circuit 6. At the time of a send action, RF oscillation control circuit 22 outputs transmit data to the RF oscillator circuit 2, and carries out the ASK modulation of the sending signal for the RF oscillator circuit 2 ON and by carrying out off control, and the sending signal by which the ASK modulation was carried out is sent out from an antenna 8.

[0034] (4th operation gestalt) Drawing 6 is the concrete circuit diagram of the transmitter-receiver 31 by still more nearly another operation gestalt of this invention, and shows the bidirectional transmitter-receiver of the FSK (frequency shift transmission) method using the self-excitation type super-regenerative reception circuit 4. In this transmitter-receiver 31, since the configuration of the RF oscillator circuit 2, the quenching oscillator circuit 3, the quenching oscillation control circuit 5, and a low pass filter 7 is the same as that of what was shown in drawing 3 , it omits explanation. It is constituted by D/A converter (digital to analog converter) 32, and a modulation circuit 6 carries out potential control of the RF oscillator circuit 2 by outputting the voltage signal of V1 and V2 (V1<V2) to the RF oscillator circuit 2 according to "0" and "1" code of transmit data at the time of a send action, and by changing parasitic capacitance, a modulation circuit 6 changes an oscillation frequency to F1 and F2, and performs the FSK modulation. If two kinds of potentials V1 and V2 join the RF oscillator circuit 2, when the oscillating condition by the Vcb-Cob property of a transistor TR20 changes, a frequency will change and the FSK modulation of the sending signal will be carried out. In this way, the sending signal by which the FSK modulation was carried out is sent out from an antenna 8.

[0035] Moreover, since the super-regenerative reception circuit 4 is a detector circuit in which the FSK reception is possible from the first, it can also receive and detect this transmitter-receiver 31 for the FSK modulating signal. That is, since electrical-potential-difference change deltaV=V2-V1 will appear in a reception output as shown in drawing 8 R> 8 if it has the frequency 1 receiving property as shown in drawing 7 and received frequency changes, the super-regenerative reception circuit 4 can receive and detect the FSK signal.

[0036] Drawing 9 is the concrete circuit diagram showing the bidirectional wireless transmitter-receiver 41 of the FSK modulation technique which used the separate excitation type super-regenerative reception circuit. It has the same configuration as the transmitter-receiver 11 which used the separate excitation type playback receiving circuit of drawing 4 R> 4 except modulation circuit 6, and this transmitter-receiver 41 constitutes a modulation circuit 6 with D/A converter 32 as well as the modulation circuit 6 of the transmitter-receiver 31 shown in drawing 6 , according to the same operation, it carries out the FSK modulation of the sending signal, and carries out FSK detection of the input signal.

[0037] (Application of a transmitter-receiver) Although the transmitter-receiver of this invention has various applicable fields, it explains some of them below. Drawing 10 - drawing 12 show the wireless door-lock equipment of the car 51 which used the transmitter-receiver of this invention. As shown in drawing 10 , this transmits a wireless

sending signal to the controller (henceforth a slave station) 53 carried in the car 51 from the controller 52 by the side of actuation (henceforth a master station), and as it makes the door of a car 51 lock or unlock, it is giving the response acknowledgement function between the master station 52 and the slave station 53 with the control signal outputted from a slave station 53.

[0038] The master station 52 is equipped with the transmitter-receiver 59 concerning the annunciators 56, such as a lamp the locking switch 54, the release switch 55, and for a response check, and a buzzer, arithmetic and program control 57, storage 58, and this invention as shown in drawing 11 . If a deer is carried out and the locking switch 54 or the release switch 55 is operated by the operator, the locking instruction or release instruction by the switches 54 and 55 will be transmitted to arithmetic and program control 57. The arithmetic and program control 57 which received the instruction calls the command code according to the content of the instruction, and the ID code which performs discernment of a master station 52 from storage 58, and generates the sending signal incorporating these two codes. The transmitter-receiver 59 when the locking switch 54 or the release switch 55 is operated is controlled to work as a sending circuit with arithmetic and program control 57. And this sending signal is modulated to a RF signal with a transmitter-receiver 59, and it emanates to space from an antenna 8.

[0039] The slave station 53 carried in the car 51 is equipped with locking or the actuator 63 for carrying out release for the transmitter-receiver 60 concerning this invention, arithmetic and program control 61, a store 62, and door-lock equipment, as shown in drawing 12 . The transmitter-receiver 60 is controlled in the usual standby condition to work as a receiving circuit with arithmetic and program control 61. The sending signal sent to the slave station 53 from the master station 52 is caught by space propagation with the antenna 8 of a slave station 53, and command code and an ID code are detected with a transmitter-receiver 60. The comparison test of the detected code is carried out to the code in storage 62 with arithmetic and program control 61. When an ID code is in agreement here, arithmetic and program control 61 outputs the control signal according to the content of command code to an actuator 63, it responds to command code and the door of a car 51 is made it to lock or unlock.

[0040] Subsequently, if a door checks locking or that release has been carried out as a command, the arithmetic and program control 61 of a slave station 53 outputs the acknowledge signal which controlled to commit a transmitter-receiver 60 as a sending circuit, and contained the cryptographic key (it may be the same as an ID code, and you may differ), will transmit the acknowledge signal modulated with the transmitter-receiver 60 from an antenna 8, and will answer.

[0041] It is controlled so that a transmitter-receiver 59 works as a receiving circuit with arithmetic and program control 57 immediately after operating the locking switch 54 or the release switch 55, and on the other hand sending out a sending signal from an antenna 8 in a master station 52. Therefore, if an acknowledge signal is sent from a slave station 53, a reply signal will be caught with the antenna 8 of a master station 52, and will be detected by the transmitter-receiver 59. If the arithmetic and program control 57 of a master station 52 carries out comparison collating of the detected acknowledge signal with the cryptographic key information in storage 58 and its code corresponds, the information told by the acknowledge signal will be transmitted to an operator with the annunciators 56, such as a lamp and a buzzer.

[0042] Thus, improvement in a high-speed response and crime prevention nature can be aimed at by using the transmitter-receivers 59 and 60 of this invention for wireless door-lock equipment, and including cryptographic key information in a reply signal further.
[0043] (The 2nd application) It is another application of the transmitter-receiver of this invention which is shown in drawing 13 - drawing 15 , and it is wireless engine starter equipment of a car 71. This gives the response acknowledgement function which returns a reply signal including the information which shows the condition of an engine or a change gear to a master station 72 from the slave station 73 in which it was carried by the car 71 in the wireless engine starter equipment which carries out remote control of start up and a halt of the engine of a car 71 by the wireless sending signal from the master station 72 which is an actuation side, as shown in drawing 13 .
[0044] The master station 72 is equipped with the transmitter-receiver 79 concerning the annunciators 76, such as a lamp the engine start switch 74, the engine-stop switch 75, and for a response check, and a buzzer, arithmetic and program control 77, storage 78, and this invention as shown in drawing 14 . If a deer is carried out and the engine start switch 74 or the engine-stop switch 75 is operated by the operator, the engine start instruction or engine-stop instruction by the switches 74 and 75 will be transmitted to arithmetic and program control 77. The arithmetic and program control 77 which received the instruction calls the command code according to the content of the instruction, and the ID code which performs discernment of a master station 72 from storage 78, and generates the sending signal incorporating these two codes. In the master station 72 which had the engine start switch 74 or the engine-stop switch 75 operated, the transmitter-receiver 79 is controlled by arithmetic and program control 77 to work as a sending circuit. And this sending signal is modulated to a RF signal with a transmitter-receiver 79, and it emanates to space from an antenna 8. In the master station 72 which the engine start switch 74 or the engine-stop switch 75 was operated, and sent out the sending signal from the antenna 8, it changes so that a transmitter-receiver 79 may work as a receiving circuit with arithmetic and program control 77.
[0045] On the other hand, the slave station 73 carried in the car 71 is equipped with the transmitter-receiver 80 concerning this invention, arithmetic and program control 81, the store 82, a starter 84 and a fuel supply system 85, and the engine control system 83 that controls ignition 86 grade as shown in drawing 15 . In the usual standby condition, it is controlled by the slave station 73 so that a transmitter-receiver 80 works as a receiving circuit with arithmetic and program control 81. The sending signal sent to the slave station 73 from the master station 72 is caught by space propagation with the antenna 8 of a slave station 73, and the recovery of command code and an ID code is performed with a transmitter-receiver 80. The comparison test of the code to which it restored is carried out to the code in storage 82 with arithmetic and program control 81. When an ID code is in agreement here, arithmetic and program control 81 outputs the control signal according to the content of command code to an engine control system 83, and makes a starter 84, a fuel supply system 85, and ignition 86 grade control according to command code.
[0046] Subsequently, arithmetic and program control 81 detects that engine start up or an engine shutdown was successful or that one of actuation went wrong by failure of an engine and a change gear. Subsequently, change arithmetic and program control 81 so that a transmitter-receiver 80 may be committed as a sending circuit, and it makes a reply signal including the information which shows a success or failure in control action output

from a transmitter-receiver 80, and answers by sending out a reply signal through an antenna 8.

[0047] If this reply signal is received by the master station 72, it will know that the arithmetic and program control 79 of a master station 72 cannot put an engine into operation based on the information included in the reply signal because of failure of having succeeded in engine start up or an engine shutdown or an engine, or a change gear etc., and a flash condition of a lamp, a difference in the tone of the sound of a buzzer, etc. in an annunciator 76 will report this.

[0048] Thus, when it fails by adopting the transmitter-receivers 79 and 80 of this invention as wireless engine starter equipment, and including failure information etc. in a reply signal further, what is depended on failure of transmission and reception, and the thing to depend on engine failure can be reported to an operator. Moreover, if the transmitter-receivers 79 and 80 of this invention are used for wireless engine starter equipment, since a master station 72 can be miniaturized, the portability of a master station 72 improves. Moreover, if the transmitter-receivers 79 and 80 of this invention are used, since power consumption can be made small, the cell of a master station 72 can be made to be able to withstand long use, changing-battery frequency can be reduced, and consumption of a mounted dc-battery can be reduced even in a slave station 73. Furthermore, since the condition of a car 71 can be checked in the master station 72 (annunciator 76) at hand, the soundness and the safety of actuation increase and the insecurity of the operator whether the engine has started actually can be swept away.

[0049] (The 3rd application) Drawing 16 - drawing 18 are still more nearly another applications, and show wireless garage door opening close equipment. This gives a response acknowledgement function to the wireless garage door opening close equipment which opens and closes the door (shutter) 92 of a garage 91 by the wireless sending signal from the master station 93 which is an actuation side, as shown in drawing 16 .

[0050] The master station 93 is equipped with the transmitter-receiver 100 concerning the annunciators 97, such as a lamp the door Kaisei switch 95, the door closing switch 96, and for a response check, and a buzzer, arithmetic and program control 98, storage 99, and this invention as shown in drawing 17 . If a deer is carried out and the door Kaisei switch 95 or the door closing switch 96 is operated by the operator, the door Kaisei instruction or door closing instruction by the switches 95 and 96 will be transmitted to arithmetic and program control 98. The arithmetic and program control 98 which received the instruction calls the command code according to the content of the instruction, and the ID code which performs discernment of a master station 93 from storage 99, and generates the sending signal incorporating these two codes. If the door Kaisei switch 95 or the door closing switch 96 is operated, arithmetic and program control 98 will be controlled to commit a transmitter-receiver 100 as a sending circuit. And this sending signal is modulated to a RF signal with a transmitter-receiver 100, and it emanates to space from an antenna 8. In the master station 93 which the door Kaisei switch 95 or the door closing switch 96 was operated, and sent out the sending signal from the antenna 8, it changes so that a transmitter-receiver 100 may work as a receiving circuit with arithmetic and program control 98.

[0051] On the other hand, the slave station 94 installed in the garage 91 is equipped with Kaisei or the motor 104 for making it close for the transmitter-receiver 101 concerning this invention, arithmetic and program control 102, the store 103, and the garage door 92,

as shown in drawing 18 . Moreover, the transmitter-receiver 101 is controlled by the slave station 94 in a standby condition to work as a receiving circuit with arithmetic and program control 102. The sending signal sent to the slave station 94 from the master station 93 is caught by space propagation with the antenna 8 of a slave station 94, and detection of command code and an ID code is performed with a transmitter-receiver 101. The comparison test of the detected code is carried out to the code in storage 103 with arithmetic and program control 102. If an ID code is in agreement here, arithmetic and program control 102 will output the control signal according to the content of command code to a motor 104, and will open or close the garage door 92 according to command code.

[0052] Subsequently, if a door checks locking or that release has been carried out as a command, will change arithmetic and program control 102 so that a transmitter-receiver 101 may be committed as a sending circuit, and it will make a reply signal including the information showing the condition of the garage door 92, or cryptographic key information output from a transmitter-receiver 101, and will transmit a reply signal to a master station 93 through an antenna 8.

[0053] An annunciator 97 reports a master station 93 collating cryptographic key information, if a reply signal is received immediately after sending a sending signal, and the garage door 92 opening it based on the information about the condition of the garage door 92 contained in a reply signal when cryptographic key information is in agreement, or having closed it.

[0054] Thus, the effectiveness of improvement in a high-speed response and crime prevention nature can be acquired by adopting the transmitter-receivers 100 and 101 of this invention as wireless garage door opening close equipment, and including cryptographic key information in a reply signal further. Moreover, since a master station 93 can be miniaturized by using the transmitter-receivers 100 and 101 of this invention, the portability of the master station 93 which is an actuation side improves. Moreover, since power consumption can be lessened by using the transmitter-receivers 100 and 101 of this invention, cell consumption of a master station 93 is suppressed, changing-battery frequency is lessened, and consumption of a mounted dc-battery can be reduced in a slave station 94 side. Furthermore, since the switching condition of a garage 91 can be checked in the master station 93 at hand, grasp of the closing motion situation of the garage door 92 is attained also in the situation that closing motion of a direct check is impossible in night etc.

[0055] (The 4th application) Drawing 19 - drawing 21 are still more nearly another applications, and show the telecontrol system for operating a device by remote control. This gives a response acknowledgement function to the telecontrol system for moving the devices 111, such as a car in the location left by the wireless sending signal from the master station 112 which is an actuation side, vertically and horizontally, as shown in drawing 19 .

[0056] The master station 112 is equipped with the transmitter-receiver 121 concerning the annunciators 118, such as the actuation switch 114 of top migration, the actuation switch 115 of bottom migration, the actuation switch 116 of right translation, the actuation switch 117 of left translation, a lamp for a response check, and a buzzer, arithmetic and program control 119, storage 120, and this invention as shown in drawing 17 . If a deer is carried out and one actuation switches 114-117 of vertical and horizontal

are operated by the operator, the control instruction by the actuation switches 114-117 will be told to arithmetic and program control 119. The arithmetic and program control 119 which received the instruction calls the command code according to the content of the instruction, and the ID code which performs discernment of a master station 112 from storage 120, and generates the sending signal incorporating these two codes. If one of the actuation switches 114-117 is operated, arithmetic and program control 119 will be controlled to commit a transmitter-receiver 121 as a sending circuit. And this sending signal is modulated to a RF signal with a transmitter-receiver 121, and it emanates to space from an antenna 8. In the master station 112 which one of the actuation switches 114-117 was operated, and sent out the sending signal from the antenna 8, it changes so that a transmitter-receiver 121 may work as a receiving circuit with arithmetic and program control 119.

[0057] On the other hand, the slave station 113 carried in the device 111 As shown in drawing 21 The motor control section 126 for reversing the motor control section 125 for rotating the transmitter-receiver 122 concerning this invention, arithmetic and program control 123, storage 124, and a motor normally, and moving a device 111 upwards, and a motor, and moving a device 111 below, and a handle It has the handle control section 128 for carrying out the RLC of the handle control section 127 for carrying out a RRC and moving a device 111 to the right, and the handle, and moving a device 111 to the left. Moreover, the transmitter-receiver 122 is controlled by the slave station 113 in a standby condition to work as a receiving circuit with arithmetic and program control 123. The sending signal sent to the slave station 113 from the master station 112 is caught by space propagation with the antenna 8 of a slave station 113, and detection of command code and an ID code is performed with a transmitter-receiver 122. The comparison test of the detected code is carried out to the code in storage 124 with arithmetic and program control 123. If an ID code is in agreement here, arithmetic and program control 213 will output the control signal according to the content of command code to the motor control sections 125 and 126 or the handle control sections 127 and 128, and will move a device 111 vertically and horizontally according to command code.

[0058] Subsequently, if it checks that the device 111 has moved as a command, will change the arithmetic and program control 123 of a slave station 113 so that a transmitter-receiver 122 may be committed as a sending circuit, and it will make a reply signal including the information showing the migration condition of a device 111 output from a transmitter-receiver 122, and will transmit a reply signal to a master station 112 through an antenna 8.

[0059] A master station 112 will report a decode child and the migration condition of a device for the information about the migration condition of the device 111 contained in a reply signal with an annunciator 97, if a reply signal is received immediately after sending out a sending signal.

[0060] Thus, responsibility can be raised by adopting the transmitter-receiver of this invention as a telecontrol system, and including cryptographic key information in a reply signal further. Furthermore, since a master station 112 can be miniaturized by using the transmitter-receivers 121 and 122 of this invention, the portability of the master station 112 which is an actuation side can be raised. Moreover, since power consumption can be lessened by using the transmitter-receivers 121 and 122 of this invention, cell consumption of a master station 112 is suppressed and changing-battery frequency can be

lessened. Furthermore, since the actuation condition of a device 111 can be checked in the master station 112 at hand, it can be operated grasping an actuation condition also in the situation that the device 111 used as the object for actuation cannot be seen directly, and the soundness and dependability of actuation can be raised.